The Heating and Ventilating Magazine

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Heating and Ventilating Chicago's Newest Hotel

Features of Palmer House Equipment Which Includes Concrete Air Washers and Use of Central Station Current

By Julius Wolf

GLANCING up from his table, the guest in the men's cafe of the new Palmer House finds himself admiring the colorful panorama of Chicago's lake front. The air he breathes seems as fresh and cool as the lake itself. But the lake front is only a picture painted on the wall and the delightful air in the room was taken, just a second or two before, from the torrid atmosphere outside. Though the seasons may change and outdoor Chicago may bury itself in snow and ice, the air in the room will continue to be uniformly comfortable.

In planning a new Palmer House that would carry on the prestige and traditions of the old, the owners called into counsel engineering talent which defies the seasons. This story will tell something of the means employed by the heating and ventilating engineer to keep the guests comfortable all the year round in one of the world's largest and finest hotels.

Fig. 1. Palmer House, Chicago, Ill.

GENERAL STATISTICS

Section A of the new Palmer House was opened December 21, 1925, and, when Section B is finished, in the early part of 1927, the complete building will cover almost an entire city block at Monroe and State Streets in the heart of Chicago's "Loop". A perspective view of the complete building is shown in Fig. 1. This immense structure, rising 300 ft. above street level and extending 54 ft. below, will contain 2268 guest rooms, all located above the fifth floor.

The first five floors are given up to the main lobby, the "Empire" dining room, the "Victorian" dining room, the "Red Lacquer" ball room, the "Grand" ball room, numerous private dining rooms, the extensive kitchens and provision rooms and the street-level shops. Below street level is most of the mechanical equipment and the men's cafe, (Chicago

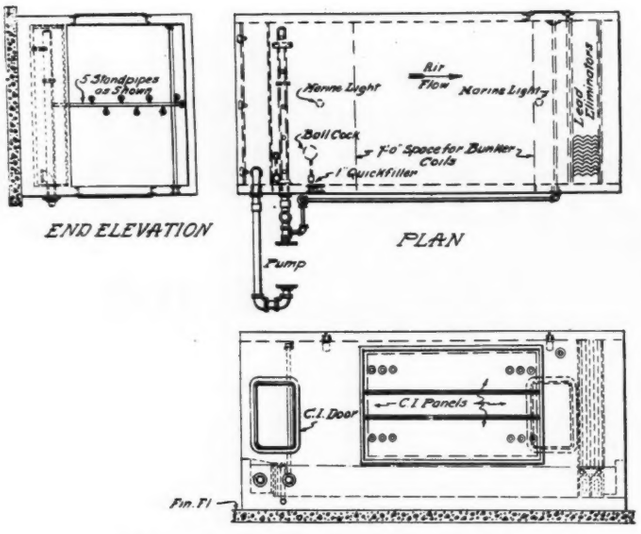


Fig. 2. Concrete Air Washer Detail, Palmer House

Room), the lunch room, barber shops, public toilets and basement shops.

A glance at the following statistics will give an idea of the immensity of this building:

Cubical contents	21,422,728 cu. ft.
Lot area	78,000 sq. ft.
Total floor area	1,742,000 sq. ft.
Total dining room space	43,842 sq. ft.
Total kitchen space	40,200 sq. ft.
Total weight of structural steel	34,000,000 lbs.
Total number of bricks	7,000,000
Estimate cost of building	$2,000,000.00

Holabird and Roche, Chicago, were the architects and engineers responsible for the design of the new Palmer House, and Thompson-Starrett Co. were the general contractors. The heating and ventilating equipment was installed by Phillips Getschow Co. and R. B. Hayward Co., associate, both of Chicago.

VENTILATING EQUIPMENT

The ventilating lay-out of the new Palmer House presents the following noteworthy features:

1. The supply and exhaust ducts comprise over a million and a quarter pounds of sheet metal and they handle 1150 tons of washed air per hour.
2. The ducts were fabricated entirely in the shops of the R. B. Hayward Company and were delivered to the building ready for erection.
3. The ventilating system in service now in Section A will fit in with the new equipment of Section B, making one complete unit.
4. This is the first public building installation using all-concrete air washers equipped with lead eliminators.
5. The kitchens have an unusually liberal ventilation of approximately 15 air changes per hour and considerable care has been exercised in equipping the stoves and ovens with exhaust ducts.

AIR INTAKES AND OUTLETS

The main air supply is drawn in from the outside at the fifth floor elevation and led down through a large vertical shaft to the air tunnels beneath the sub-basement where most of the supply fans are located. The remaining supply fans are on the fifth floor and take in air from openings through the building wall. All toilet and kitchen exhaust is carried upward and discharged above the roof, but air from the lobby and public dining rooms is led down through ducts and passed through an exhaust tunnel that discharges below the alley loading platform and thus relieves this space of motor gases from delivery vehicles.

FANS

There are 22 supply fans, in all, with a combined capacity of 510,000 cu. ft. a minute and 32 exhaust fans that handle 515,000 cu. ft. a minute. Most of the supply fans are placed in the sub-basement and the remaining ones are located on the fifth floor. The exhaust fans are distributed on the sixth and seventh floors, in the sub-basement and in the attic. They remove air from all public rooms and kitchens which utilize the main supply of washed air. In addition to this, the exhaust fans remove air from the toilet rooms and bed closets of all guest rooms.

All exhaust and supply air is handled by Clarage new-type H.V. fans, direct-driven by variable-speed Reliance D.C. motors. A speed variation of 35% is effected by manual control of special Sundh rheostats provided with each motor.

AIR WASHERS OF CONCRETE

The Clarage concrete air washers installed in the Palmer House are an innovation in their field. As illustrated in the detail shown in Fig. 2, the side walls, basin and roof are constructed of reinforced concrete ranging in thickness from 4 to 6 in. All of the interior surface of the washers was coated with special water-proofing compounds. Air from the supply fan passes first through the tempering units and thence into the spray chamber.

Where refrigeration is necessary (about 20% of the total washed air supply is refrigerated in the summer), cooling coils are installed in the spray chamber. These are direct-expansion coils and the refrigerant is admitted into them by individual manually-controlled expansion valves. From the spray chamber the air passes through the eliminators, and, through the reheating sections, out into the supply ducts.

The eliminators are novel in that they are made up of "two pound" lead sheet, held in position by small angles. Spray water is continuously recirculated by a small motor-driven centrifugal pump and make-up is supplied from the service lines by float control. Attention should be directed to the unusual practice in locating four of these air wash-

ers directly over the grand foyer and other elaborately-decorated public rooms.

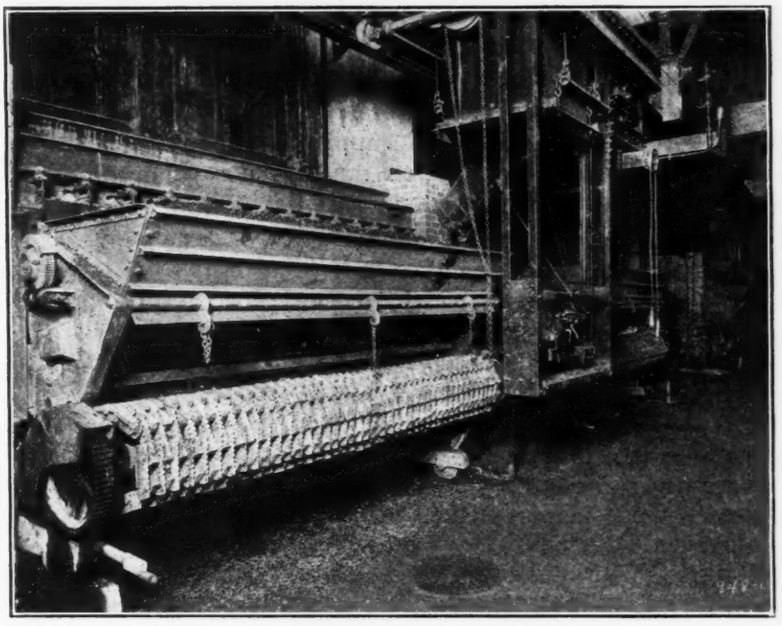


Fig. 3. View of Boiler Room, Palmer House, Showing Stokers and Coal Handling Equipment

DUCTS COMPRISE OVER 1,000,000 LBS. OF SHEET METAL

It is estimated that three quarters of a million pounds of sheet metal were used in fabricating the exhaust and supply ducts of Section A and that an additional half a million pounds of duct will be installed in Section B. Departing from usual Chicago practice, the contractors fabricated this enormous quantity of duct entirely in their shop and delivered it on the job ready for erection, making it possible for one man to supervise the entire erection. The complexity of the duct layout was furthered by the limited head room. In some cases seven or eight ducts were crowded above one another with little clearance between. The maximum allowable velocity in the supply ducts is 1000 ft. per minute and the supply openings were proportioned on a basis of 350 ft. per minute outlet velocity. The layout of ducts now installed in Section A has been planned in such a way that the ducts will interconnect with those of the new Section B with a minimum of delay and loss of service.

KITCHEN EXHAUST HOODS

Special care was taken in providing the ventilation for the vast kitchens of the Palmer House. A general plan of four-minute air changes was followed throughout all of the kitchens. Special exhaust hoods have been built extending over all the ovens and stoves and the sight of escaping vapors or smoke from the cooking, so common in many large kitchens is quite rare here.

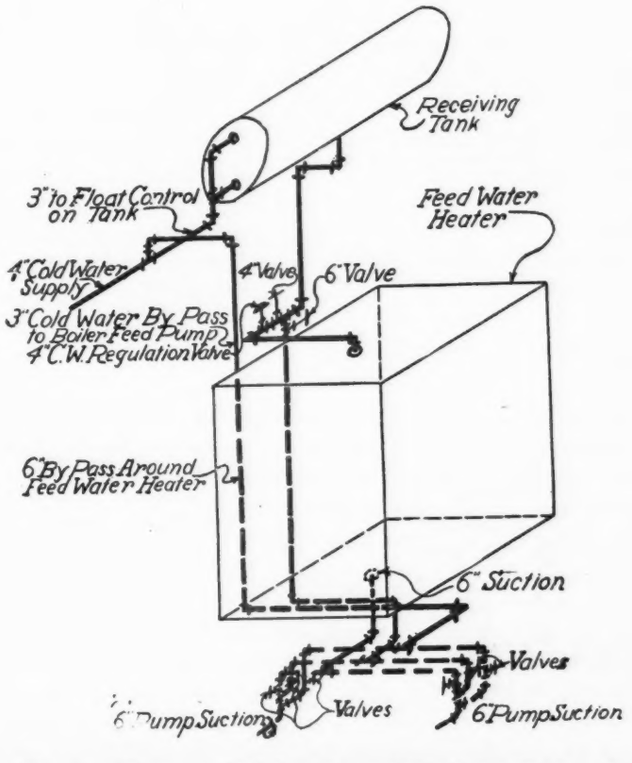


Fig. 4. Diagram of Piping Around Receiving Tank and Feed-Water Heater, Palmer House

AIR REFRIGERATION PLANT

A description of the ventilation system should include some mention of the apparatus used to refrigerate the air that is supplied to the lobby and public rooms in the summer. The main unit is a 150-ton, 8x28 in. Brunswick-Kroeschell carbon-dioxide compressor, direct-connected to a 22x36 in. Murray Corliss Rolling mill-type engine. Both engine and compressor are mounted on a separate foundation pier that extends down to bed rock and is insulated from the building slab by special tar compound to prevent the vibration from affecting the building. Standard two-pipe condensing coils are used and the water that is circulated through these coils is utilized in the house service mains.

HEATING SYSTEM

An analysis of the heating system of the Palmer House discloses the following points of interest:

1. This is one of the largest installations that has ever been provided for a single hotel. It includes 150,000 sq. ft. of direct radiation and 40,000 sq. ft. of Vento blast radiation.
2. The Palmer House is one of the few large Chicago hotels that purchases electrical energy for power and lighting from the Commonwealth Edison Company.
3. A unique feature of the steam distributing

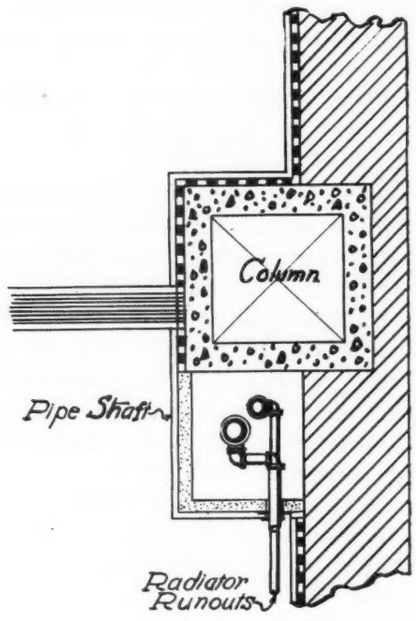
system is the use of special expansion tanks connected to the attic mains to act as reservoirs of steam supply.

4. By an ingenious method of pipe connection the 20-inch vertical main, supplying the down-feed system, acts as an emergency exhaust vent for the steam-driven auxiliaries.
5. The risers supplying down feed to the radiators are not dripped by individual traps but are dripped in groups by a single heavy-duty trap.

THE BOILER PLANT

Steam for the heating systems and auxiliaries is generated by four Brunswick-Kroeschell horizontal water-tube boilers, rated at 645 H.P. each. These boilers are located in the third sub-basement. Fuel is burned on 11 x 15 Green natural-draft chain grate stokers designed to develop 200% of rating on 10,000 B.T.U. coal. The stokers can be driven either by a motor or a small vertical engine. The stack is 9 ft. 6 in. inside diameter and extends up through the inside of the building to a total elevation of 365 ft. above the boiler room floor.

Coal is unloaded from trucks in the alley down into concrete bunkers that have a storage capacity of 10 days' full load supply. From these bunkers the coal descends into a weighing larry which supplies the stoker hoppers by gravity. A bucket conveyor elevates the ash from the boiler pit to an overhead hopper which feeds it down by gravity into ash cars that carry it off via the Chicago Tunnel. The conveyor is so arranged that coal can be brought in by the same route and elevated to spe-



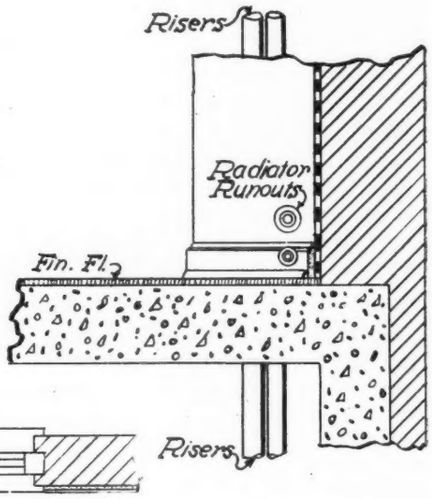


Fig. 5. (Above). Detail of Risers and Runouts for Radiators, Palmer House

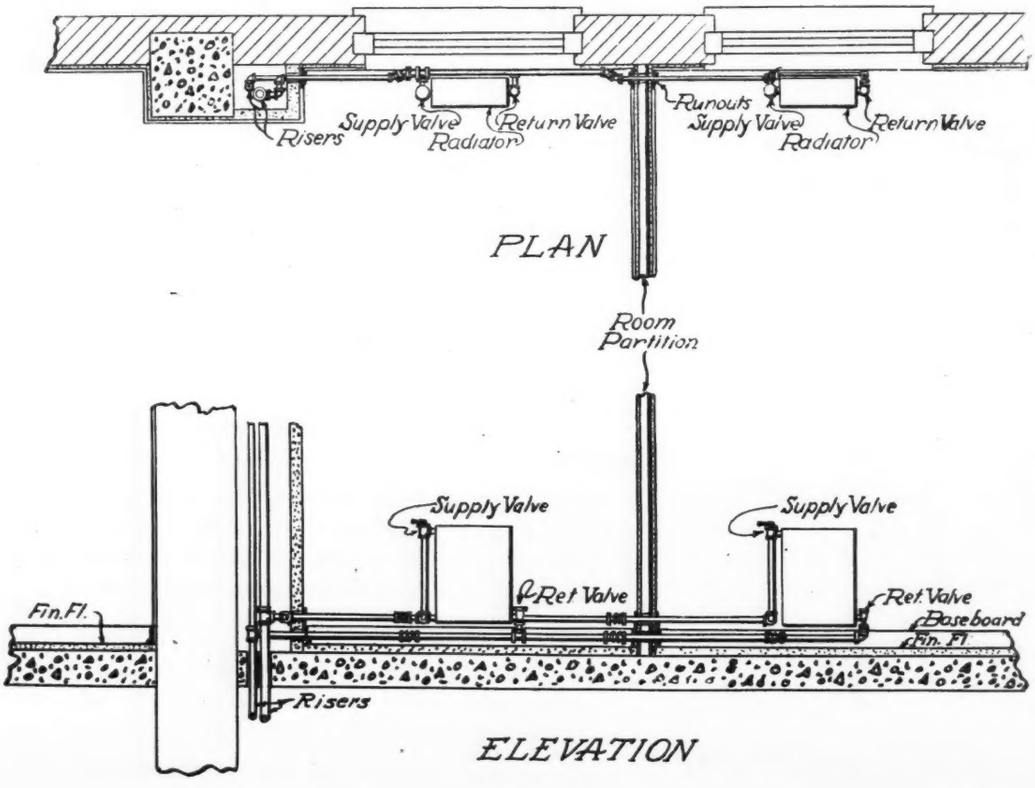


Fig. 6. (Left.) Typical Radiator Connections, Palmer House

cial coal bunkers. An ash jet conveyor is also installed as an emergency stand-by measure. A view of the boiler fronts and stokers is shown in Fig. 3.

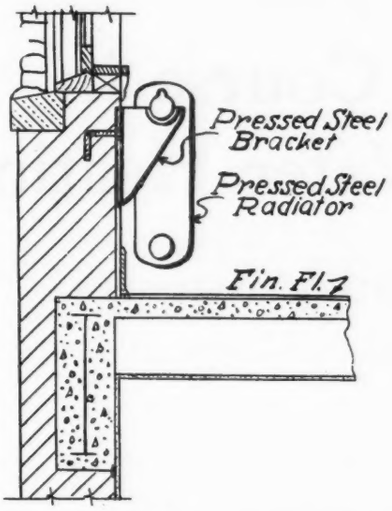


Fig. 7. Method of Supporting Radiators, Palmer House

BUILDING HEATED BY LOW-PRESSURE VACUUM SYSTEM

The heating installation is essentially a low-pressure-vacuum system adapted to the needs of this particular building arrangement. Direct radiation sufficient to supply window and wall losses is installed in all the guest rooms, but the public rooms have only enough direct radiation, concealed in the walls, to make up the heat transmission loss. Steam from the boilers at 125 lbs. per square inch is throttled down to 1 lb. per square inch pressure by reducing valves and mingles with the exhaust from the CO_2 compressor, steam-driven boiler-feed pumps, vacuum pumps, and other auxiliaries in a common low-pressure header which supplies both the direct radiation, service water heaters, and Vento radiation. The returns, at 8-in. vacuum, are handled by Worthington vacuum pumps that discharge into receiving tanks. From the receiving tanks the condensate follows the customary path through the feed-water heater to the boiler-feed pumps and thence to the boiler. (See Diagram Fig. 4.)

TOTAL RADIATION AGGREGATES 150,000 SQ. FT.

The direct radiation consists of 6000 wall-hung, water type, American column radiators, aggregating 150,000 sq. ft. The guest room radiators are 2-col., 26-in., and many of them have been equipped with Winchester radiator cabinets. The radiators for the public rooms are concealed in hollow spaces in the outer walls and are automatically controlled to maintain 70° F. at the inside surface of the wall. All radiators are fitted with Marsh inlet valves. Warren Webster traps are used throughout for all direct and Vento radiation. The Vento surface totals 40,000 sq. ft. and temperature control of air supply is maintained by Powers regulators. A typical detail of the method of making runouts is shown in Fig. 5 and the method of making connections to the radiators is indicated in Fig. 6, while the scheme of radiator support on a bracket is illustrated in Fig. 7.

STEAM PIPING

There are three main headers in the boiler room, the high-pressure boiler header, the high-pressure collecting header and the low-pressure distributing header. High-pressure steam from the 14-in. collecting header passes successively through an 8-in. and a 12-in. Boylston pressure-reducing valve to the distributing header which also acquires exhaust steam from the various auxiliaries. From this 20-inch distributing header the low-pressure steam is led across into the various distributing mains which feed the sub-basement Vento units and the basement mains for the up-feed system that is used on the lower five floors.

The 20-in. main now rises vertically to the fifth floor where a 12-in. take-off is taken to supply the Vento radiation there.

From this point an 18-in. vertical main extends up to the attic where a 12-in. branch is taken off for each of two special 3 x 8 cylindrical expansion tanks whose function is to provide a reservoir of steam supply to take care of sudden fluctuations in the load. (See Fig. 8.)

The 18-in. line continues to rise from this point and connects into a Cochrane back-pressure valve, with an outlet terminating in an exhaust head on the roof. The back-pressure valve is set at 2 lbs. per square inch pressure and thus permits the vertical supply main to do duty as an exhaust vent in case the supply of exhaust steam exceeds the demand.

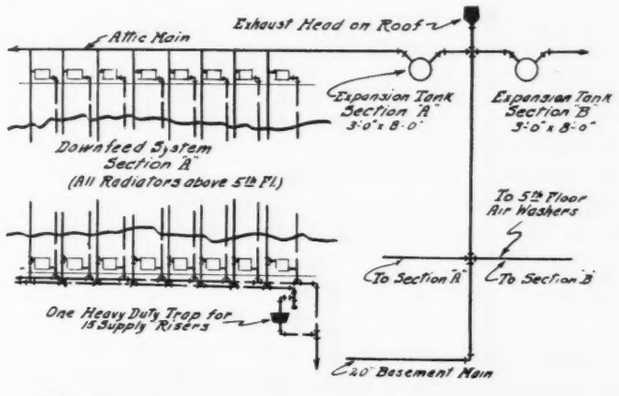

Exhaust Head on Roof
Attic Main
Expansion Tank Section "A" 3'-0" x 8'-0"
Expansion Tank Section "B" 3'-0" x 8'-0"
Downfeed System Section "A"
(All Radiators above 5th Fl.)
To 5th Floor Air Washers
To Section "A"
To Section "B"
One Heavy Duty Trap for 15 Supply Risers
20" Basement Main

Fig. 8. Diagram of Steam and Return Piping, with Drip System, Palmer House

An unusual circumstance presented itself in applying the down-feed system to the upper floors only. The bottom of all the risers were at the fifth floor level and individual drip traps, if installed, would have been inaccessible in most cases, for inspection or repair. To remedy this condition, drip headers were run, connecting into the lower end of a dozen or more risers and carrying the com-

(Continued on Page 84)

This is the twenty-first lesson of The Heating and Ventilating Magazine's

New Home-Study Course in Gravity Steam and Water Heating

Lesson No. 21—Vapor Heating Systems

By Ara Marcus Daniels

VAPOR is steam at or slightly below atmospheric pressure. Thus, vapor heating systems are, in general, negative pressure steam systems in which no pump is used to produce the partial vacuum. This negative pressure results in the formation of vapor when the pressure is below the atmosphere. Modulation and atmospheric systems are similar to vapor systems except that they lack the vacuum characteristic.

A positive pressure is carried on the boiler, but this pressure may be and, in a properly-installed vapor system, probably seldom exceeds the steam or vapor pressure in a tea kettle, partially filled with boiling water.

Escaping steam or vapor from a tea kettle rises as it leaves the spout and spreads out in white clouds because such vapor is lighter than the surrounding air. It is not forced upwards but rises because of its relative weight. In a similar manner, vapor given off from the water surface in a boiler in which the temperature is maintained at or near 212° F. (boiling point of water at atmospheric pressure), rises and is guided, by means of pipe lines, to the radiators throughout the structure that is to be warmed. Thus, efficient functioning of a vapor system depends upon the ability to distribute this very low pressure steam throughout the entire system, with the positive assurance that every radiator will receive and continue to receive sufficient volumes of vapor to permit the emission of ample heat in unit time.

As elimination of air and water from the systems of steam heating covered in previous lessons is essential to efficient functioning thereof, so must a vapor system rid itself of these obstacles continually if the vapor is to enter and warm the radiator properly. Various mechanical devices are available to-day for removing air from the system and permitting the return of the condensed water to the boiler by gravity or assuring its return by means of a return trap.

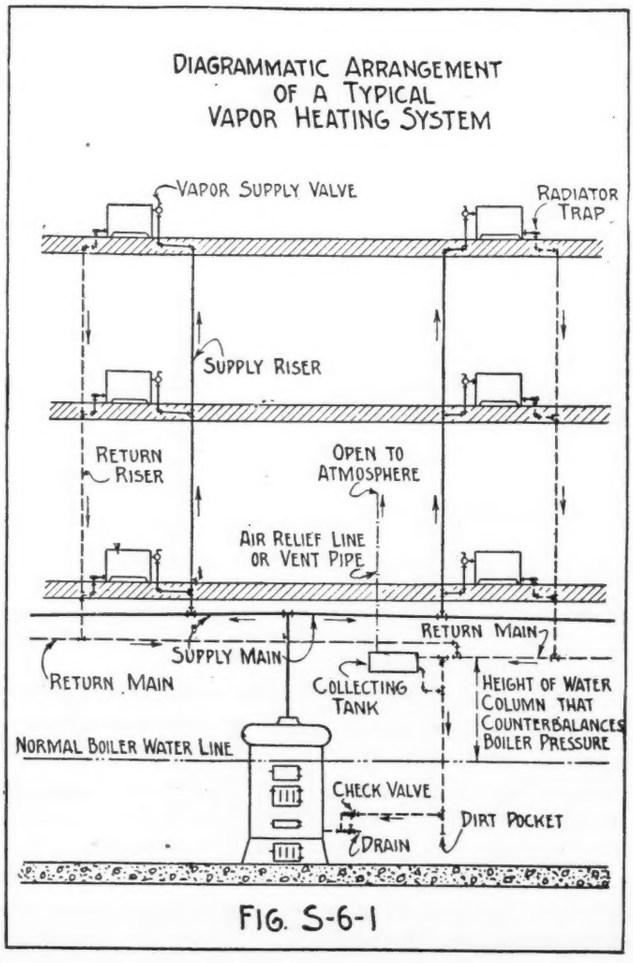


FIG. S-6-1

TYPICAL VAPOR HEATING SYSTEM WITHOUT RETURN TRAP

In Fig. S-6-1 there is shown a diagrammatic layout for a typical vapor heating system without a return trap. In addition to the boiler, piping and radiators, the essential features are

(1) a special radiator supply valve for each radiator,
(2) a special trap on the return side of each radiator,
(3) a device for collecting all air eliminated from the radiators with means for expelling same from the

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VAPOR VALVES

CAPACITIES — DIMENSIONS

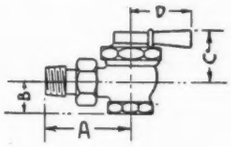

TABLE S-6-1

DUNHAM

SIZE INS.	CAPACITY SQ. FT.	DIMENSIONS A	B	C
1/2	1 - 40	3	1 1/8	1 15/16
3/4	41 - 100	3 1/16	1 1/4	1 15/16
1	101 - 180	3 1/8	1 1/2	2 1/8
1 1/4	181 - 300	3 7/16	1 5/8	2 7/16

TABLE S-6-2

ILLINOIS

SIZE INS.	CAPACITY SQ. FT.	DIMENSIONS A	B
3/4	1 - 100	2 5/8	1 3/8
1	101 - 200	3 1/8	1 9/16
1 1/4	201 - 275	3 1/2	1 3/4
1 1/2	301 - 400	4	2

TABLE S-6-3

TRANE

SIZE INS.	CAPACITY - SQ. FT. PRESSURE DIFFERENCES 4 OZ.	8 OZ.	1 LB.	2 LB.	DIMENSIONS A	B	D
1/2	20	28	39	55	2 3/4	1 5/16	2 1/8
3/4	64	90	125	175	2 3/4	1 5/16	2 1/8
1	149	210	294	410	3	1 3/8	2 1/8
1 1/4	375	525	735	1030	3 1/2	1 3/4	2 1/8

RADIATOR TRAPS

CAPACITIES — DIMENSIONS

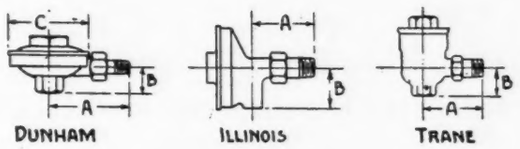

TABLE S-6-4

DUNHAM

No.	SIZE INS	CAPACITY SQ.FT. DIRECT	DIMENSIONS A	B	C
1	1/2	100	3 1/8	1 1/8	2 3/8
2	1/2	350	3 3/4	1 1/4	3 15/16
3	3/4	450	3 7/8	1 1/4	3 15/16
4	3/4	1500	2 3/4	2 3/16	5 7/8

TABLE S-6-5

ILLINOIS

No.	SIZE INS.	CAPACITY SQ.FT. DIRECT	DIMENSIONS A	B
1	1/2	75	2 3/8	1 5/8
2	1/2	200	2 1/2	1 3/4
3	3/4	500	2 3/4	2 7/16
4	1	1500	1 3/4	3 1/4

TABLE S-6-6

TRANE

No.	SIZE INS.	CAPACITY - SQ.FT. DIRECT PRESSURE DIFFERENCE 4 OZ.	8 OZ.	1 LB	2 LB.	DIMENSIONS A	B
B-2	1/2	125	175	245	344	3 1/4	1 7/16
B-3	3/4	375	525	735	1030	3 1/4	1 7/16
B-4	1	750	1050	1700	2200	3 9/16	1 23/32

system and for holding temporarily condensed water for return to the boiler.

SPECIAL RADIATOR VALVES

Many firms manufacture supply valves suitable for use on the radiator of a vapor system. These special valves are packless, that is, no packing of any kind is used to assure steam and air tightness. Corrugated metallic bellows take the place of stuffing-box and packing. This metallic bellows expands and contracts as the valve disk is raised or lowered. The material is extremely flexible and strong.

The valve is equipped with a lever handle and so built that the valve may be completely opened or closed with but a part turn of the handle. Some valves open fully on a half turn, others require as much as seven-eighths turn.

Work Problem S-6-1.

Manufacturers of vapor valves supply complete information concerning their product and it is well for every student engaged in the heating business to provide himself with a set of descriptive matter covering the products manufactured for vapor heating work.

In Tables S-6-1, S-6-2, and S-6-3, such data for three manufacturers' products are shown as examples.

Work Problem S-6-2.

SPECIAL TRAP FOR RADIATORS

Traps used on the radiators of a vapor system are actually air and water relief valves. In order that a radiator supplied with steam or vapor may function properly, it should be kept free of air and the water of condensation should be removed promptly. The type of radiator trap illustrated with Tables S-6-4, S-6-5 and S-6-6 is built by many manufacturers. These traps are of two general types, employing, respectively, the thermostatic and float principle of operation.

The thermostatic trap is by far the more generally used. The actuating element of a thermostatic trap is a metallic substance having a high expansion coefficient which, when heated, expands and closes the return opening.

Thus air and water are permitted to pass from the radiator into the return, but as soon as the vapor or steam of a higher temperature comes in contact with the metallic element, the element expands, closes the opening, and remains closed until

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Super Power Idea Applied to Public Service Consumers

Unique Plan for Utilizing Large Heating Systems as Condensers for Turbo-Electric Generators and Recovering By-Product Current from Consumers' Heating Steam for General Primary Distribution

By *Ira N. Evans*
Engineer, R. O. Derrick, Inc., Detroit, Mich.

THIS article describes a plan for utilizing the consumer's heating system as a condenser for a high-pressure turbo-generator to recover by-product power from the heating fuel. The turbo-generator functions as a synchronized sub-station of the public service company for general distribution of this primary power, otherwise not recoverable. The heavy investment in equipment and in the peak load, due to serving large consumers, to a large extent, is obviated.

YEARS ago, one of the greatest obstacles the public service company had to overcome, in selling power, was the economy of the isolated plant utilizing exhaust steam for heating.

The wasteful management of the isolated plants, the enterprise and ability of the public service sales engineers, and the increased economy of large turbo-generators and condensers has gradually put the isolated plant for power out of the picture.

The district heating companies also found that exhaust steam heating did not pay, for the same reasons. They changed their by-product plants to high pressure, thereby increasing the heating plant capacity and gross income. This arrangement caused two independent outfits, one for power generation, wasting *90%* of the heat to a lake or river for high vacuum, and another boiler plant for heating, 40% of which is idle 25% of the winter and 90% to 100% idle four months in summer. They were unable to make this pay except in congested city districts at the very high selling price equalling $25 to $30 per ton for fuel actually consumed.

Large manufacturing plants and all buildings not on the heating service line have to provide their own boiler plants for heating. In many cases, nearly the same fuel and capacity are required that would serve for generating power coincident with the heating. The promotors and consumers rid themselves of the investment for generating equipment and shift the lighting and power bills to the tenants, as far as possible.

At the last meeting of the National District Heating Association, the members recognized this uneconomic condition and remedies were suggested along the lines of power recovery from heating fuel or some form of exhaust steam heating.

When district heating plants were first built, comparatively small reciprocating power units were used, and the margin between the steam rate of the central station power and isolated plants was not very great. The advent of superheated steam, high vacuum and large turbo-generator units in the central station widened the operating margin of non-condensing isolated plants to three or four times the rate for straight central-station power.

The lack of co-ordination of the heating and power loads on the smaller plants, short periods of operation for the maximum demand and the requirement for double equipment, made the cost of exhaust steam heating prohibitive.

METHOD OF RECOVERY OF PRIMARY POWER FROM THE CONSUMER'S HEATING SYSTEM AND FUEL

Any heating plant, however, functions as a natural condenser, utilizing largely the latent heat of the steam, which is wasted in power generation as only 7% of the heat actually is returned in electric current. Its capacity, however, is variable with the outside weather.

Here is a series of conditions which, if co-ordinated intelligently, would benefit everyone, the public service company, the consumers and public at large.

It is the purpose of this article to show how the public service company, at a handsome profit, can recover current from the heating fuel and boilers of their customers, with a corresponding saving in fuel and duplication of equipment. At the same time, there would be little danger of the consumers taking over the power generation themselves and curtailing the business of the public service company for reasons hereafter demonstrated.

It is impossible to generate power economically on a non-condensing basis in competition with the public service company; and condensing plants under 200 K.W. are questionable, due to the relation of possible output to installation cost.

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For economical power recovery, we must have the turbo-generator under vacuum and, therefore, the steam heating system, at atmospheric pressure, is eliminated as a by-product auxiliary.

A forced water heating system is less expensive to install and more economical to operate than a vapor or vacuum steam system. Its working temperature would be, say 210° F. average in zero weather, or 2% of the time, and 120° F. at the end of the heating season, with a corresponding range in heat consumption. The turbine varies in steam consumption rate 100% between say, 1 lb. back pressure and 28 in. of vacuum.

If the vacuum is arbitrarily varied on a turbine for the outside temperature periods between these limits, it will exactly balance the heating requirements of a forced water system, with a constant power load recovery from fall till spring.

The heating system becomes an adequate condenser for this power load. Tabulating the quantities we have:

TABLE 1

	0° F. Outside Temperature	60° F.
Boiler H.P.	5000	2000
Steam 34.5 per H.P., lbs.	172,500	69,000
Per cent maximum heating load	100	40
Terminal pressure exhaust	3 lbs. B.P.	26 in. vacuum
Steam rate per K.W., lbs.	35	16
Power load, kilowatts	5000	4,300
Temperature circulated water, deg. F. average	210	100

The square feet of heating surface will be approximately 500,000, and, for average weather conditions, 35° F. outside, 20 in. vacuum on the turbine.

From the discussion in Fig. 1 and the above statement, the method of utilizing the heating system as a condenser is readily demonstrated with the constant power-load recovery.

The reduced heating demand at 60° F. outside does not affect the power recovery, as the temperature is so near full vacuum that there is practically no cost of steam for heating.

These figures are for the purpose of generalizing the problem and the relation of 5000 B.H.P., 5000 K.W., 500,000 sq. ft. of heating surface will hold for all purposes, i.e., 1000 H.P., 1000 K.W., 100,000 sq. ft. of heating surface.

A CONCRETE EXAMPLE OF A DAY'S OPERATION OF AN EXISTING PLANT.

Fig. 1 is an actual operating diagram of a day's operation of a hot water condensing plant installed and operated in this manner since 1908.

The kilowatt hours are given on the upper curve and amount to 8320 K.W.H. per day. It shows that with 34° F. outside, the steam requirements for heating and power are nearly constant, while the power load varies as low as 200 K.W.

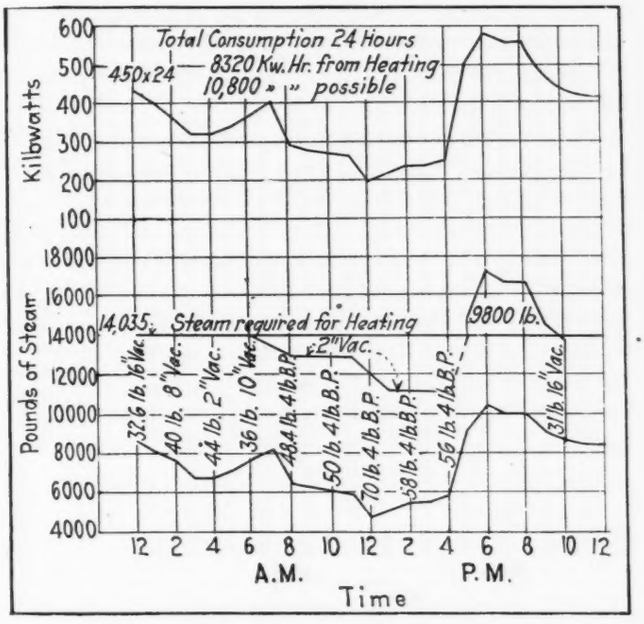


Fig. 1. Steam Required for Power Load at 28 in. Vac.

Data:
Average temperature outside between 4:00 and 6:00 P. M. 34° F.
Average temperature return water of heating system, 163° F.
Average temperature supply water of heating system, 172.5° F.
Difference in pressure between supply and return, 30.5 lbs.
Pounds of water circulated per hour by pump No. 6279, 1,480,020.
Vacuum at turbine, 15.5 in.
Net heat in steam at exhaust heater, 1002 units.
Total steam required at 28 in. of vacuum, 177,170 lbs.
Total steam not utilized at peak load, 7268 lbs. or 5.5%.
Extra boiler horsepower required at peak load, 211.
Lower curve steam consumption at 28 in. vacuum.

The balanced power load is shown where the line crosses the heating steam requirements at 10 P.M., or 450 K.W.

This means that 450 K.W. could have been carried throughout the 24 hours without any increase in steam consumption for combined power and heating or, $450 \times 24 = 10{,}800$ K.W.H. per day could have been recovered, or 30% more than the requirements, as hereinafter described. A public service company could have utilized this 30% power increase, while the consumer could not.

This plant operates 24 hours per day, and if it operated 8 to 10 hours per day, as in most plants, this difference would be considerably greater or probably somewhere about 5000 K.W.H. per day as the consumer's actual requirement.

The steam rates and probable vacuums are marked on the ordinates of the lower curve for most of the hours.

As a matter of fact, with this light power load, 4 lbs. back pressure would have been required to produce 14,000 lbs. of steam per hour. The probabilities are they actually carried 2 in. or 3 in. of vacuum, with the condenser nearly shut off, and reduced the heating steam during the middle of the day, which is the warmest period. The lower dotted line of heating during the middle of the day would be with 2 in. or 3 in. of vacuum, thus reducing the total steam requirements.

This balance is maintained by manipulating one valve in the power house and the observation of the temperatures of the heating return-water and an outdoor recording thermometer.

This valve needs adjusting about every hour or as the power load changes. The vacuum can be ranged from 3 lbs b.p. to 28 in. vacuum at will, independent of the heating or power load, and without losing the vacuum, opening the relief valve or stopping the machine. There are recording temperature thermometers on the feed and return water of the heating system, and a recording venturi meter on the pump-line, so the heat units for the system are accurately determined for any period.

Since these curves were made, the power load has been increased by selling the balance out on the line to another department at 2 cents per K.W.H.

What chance would a public service company have of selling current to this plant, inasmuch as throughout the heating season 10,000 K.W.H. can be obtained per 24 hours with no expenditure of fuel and the condenser operating at no capacity? The value of this current, at Detroit rates, would be, with transformers purchased and owned by the consumer, as follows:

COST DATA FOR A TYPICAL CASE

Assume a consumption of 8000 K.W.H. for 30 days, or 240,000 K.W.H., with 570 K.W. maximum demand.

200 K.W. × $3.00 =	$600
370 K.W. × 2.00 =	740
240,000 K.W.H. @ 0.009 =	2160
	$3500
Less 5%	175
	$3325 per month

or, for 8 months, $26,600 per annum.

There are two turbines rated at 500 K.W. each. The investment, at a liberal allowance at $70.00 per K.W., would not be over $70,000 or a gross income of $\frac{\$26,600}{\$70,000} = 38\%$ per annum.

At the same time, with this equipment, the current, at will, can be generated at full vacuum by simply turning a valve.

The heating system produces the vacuum for one machine, and two machines fully loaded can be operated with the heating system and one condenser, one machine at 28 in. or full vacuum, and the other on reduced vacuum to suit the outdoor temperature and, of course, using exhaust steam under vacuum for heating.

THE LONGER PERIOD OF OPERATION AND REDUCED EQUIPMENT THE POWER COMPANY'S ADVANTAGE IN PERFORMING THIS SERVICE

The public service company can perform this service in many places, recovering sufficient additional current to make it an object to the consumer and themselves. As noted on the diagram, the public service company, having a 24-hr. market at full load, could have obtained 10,800 units per day which, at the same rates, would be 2800 K.W. per day additional, or 2800 × 0.9c.* = $25.20 × 30 days, or $756 less 5%, or $718 per month. $718 × 8 months = $5744 per annum, or about 22% increase.

If the public service company owned one machine at $35,000, instead of two, taking the current into their mains at high tension, the actual income and investment would be:

$26,640 + $5744 = $32,384 per annum.

$\frac{\$32,384}{\$35,000} = 92\frac{1}{2}\%$ per annum gross.

It is readily seen that this consumer could afford to buy his current at regular rates, let the public service company recover the by-product high tension current, receive a rebate from the company and come out better.

If the public service company were required to serve this plant with power, they would have to provide in the main generating plant approximately 300 H.P. in boilers and 500 K.W. in generating equipment, as well as buildings and real estate. Provision would have to be made for the winter peak load.

Under the proposed scheme, the only requirement would be one 500 K.W. turbo-generator and no fuel or boilers or real estate. The winter peak would be largely taken care of indirectly from the recovered current.

In case they were required to service this plant with both heat and power separately, there would be an additional 500 H.P. in boilers in the heating plant.

The proposed scheme would require only a high-pressure steam line from the heating plant and the aforesaid turbo-generator. The real estate and power equipment and 300 H.P. in boilers would be saved for other purposes in the main generating plant.

This investment becomes quite an item where power and heating are required for large buildings in a business district. A central hot water plant is unnecessary. All that is required is a high-pressure steam line. The original steam heating installation and rate charging remains as before, both for power and heating.

TOTAL SAVING AND POWER CONSERVATION SHOWN DIAGRAMMATICALLY FOR A SEASON

Fig. 2 is a diagram from the author's section of Hool and Johnson's "Handbook on General Building Construction" (Page 1127) and may be described as follows:

The 100% area would be the steam required for

*EDITOR'S NOTE: This is the rate for industrial power, supplementary to a maximum-demand charge. It is not the general or average value of a K.W.H.

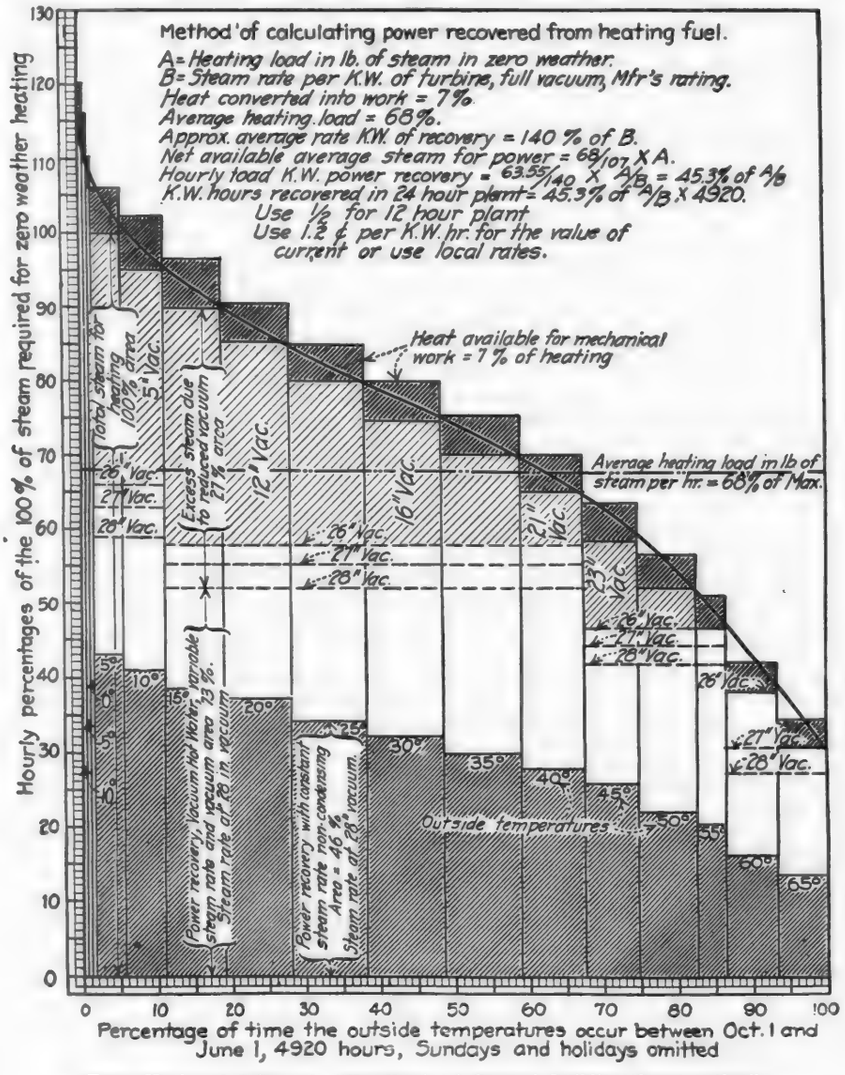
heating on a forced hot water plant, with the relative percentage of heat as ordinates counting from the base line for the various outdoor temperature periods, as abscissae, also in the form of percentages. Thus, 30° F. outside occurs 49% — 38%, or 11% of the heating season, and 75% of the heat in zero weather per hour would be required for this period.

The lines, 26 in., 27 in., 28 in. of vacuum, are amounts of steam or heat that would be required for a constant power load, say 1000 K.W. on a plant requiring 1000 H.P. for heating in zero weather, operated under these vacuums.

Note that the higher the vacuum on a power plant and the lower the steam rate, the less the saving from exhaust steam heating. If 1000 K.W. were generated for power, the small 7% areas, at the top of this diagram, would be the actual heat delivered in electrical energy.

The large areas below the vacuum lines would be the heat discharged to a lake to produce vacuum at 26 in., 27 in. or 28 in., as the case may be, and would involve something like 50 lbs. of water to be pumped for every pound of steam condensed. This would be true whether the current were generated in a public service plant or in an isolated plant, except for such variations in steam rate, due to size of unit, steam temperature conditions and vacuum.

If this machine were exhausted into a heater condenser of a water heating system and the vacuum arbitrarily varied, say, to 12 in. at 20° F. outside: 16 in. at 30° F., and 21 in. at 40° F., the steam rate would exactly balance the requirements in temperature and amount of steam for the heating system acting as a condenser. Temperature regulation would be attained without automatic control (See Table 1).


Method of calculating power recovered from heating fuel.
A = Heating load in lb. of steam in zero weather.
B = Steam rate per K.W. of turbine, full vacuum, Mfr's rating.
Heat converted into work = 7%.
Average heating load = 68%.
Approx. average rate K.W. of recovery = 140 % of B.
Net available average steam for power = 68/107 X A.
Hourly load K.W. power recovery = 63.55/140 X A/B = 45.3% of A/B
K.W. hours recovered in 24 hour plant = 45.3% of A/B X 4920.
Use 1/2 for 12 hour plant
Use 1.2 ¢ per K.W. hr. for the value of current or use local rates.
Heat available for mechanical work = 7 % of heating
Average heating load in lb of steam per hr. = 68% of Max.
Hourly percentages of the 100% of steam required for zero weather heating
Percentage of time the outside temperatures occur between Oct. 1 and June 1, 4920 hours, Sundays and holidays omitted
Outside temperatures
Total steam for heating 100% area
5" Vac.
Excess steam due to reduced vacuum 11% area
12" Vac.
16" Vac.
21" Vac.
26" Vac.
27" Vac.
28" Vac.
Power recovery, Vacuum Hot Water, variable steam rate and vacuum area 73%.
Steam rate at 28" in vacuum
Power recovery with constant steam rate non-condensing Area = 46 %
Steam rate at 28" vacuum.

From Hool and Johnson's "Handbook of General Building Construction"

Fig. 2. Relative Fuel Saving and Mechanical Power Recovery from the Heating Plant Under Condensing and Non-Condensing Operation

Note that the higher the vacuum on a power plant and the lower the steam rate, the less the saving from exhaust steam heating. If 1000 K.W. were generated for power, the small 7% areas, at the top of this diagram, would be the actual heat delivered in electrical energy.

The large areas below the vacuum lines would be the heat discharged to a lake to produce vacuum at 26 in., 27 in. or 28 in., as the case may be, and would involve something like 50 lbs. of water to be

This actually means that 27% of live steam, added to the full vacuum rate for power, would exactly do the heating. This would effect a saving of 73%, the total area of the chart representing the condensing capacity of the system.

A minimum of heat or fuel would be used, which is impossible on any constant-temperature steam system. The only means of correcting this defect

of the steam system is by expensive temperature control or intermittent heating by shutting off heating surface.

The chart shows that where heating and power operations are separated, 73% greater steam capacity is required than when they are combined, including operation.

This cannot be accomplished with a steam heating system, as the operating pressure and, therefore, the back pressure on the turbine, is constant and forces a constant power steam rate and variable power load recovery with no vacuum.

The lower hatched portion is obtained by dividing the total heating ordinate for each outside period by the constant steam rate on a turbine at no vacuum, and multiplying the result by the steam rate at full vacuum.

THE BLEEDER TURBINE

This would represent the power recovery in heat of a bleeder turbine furnishing steam at a constant back pressure. This area represents 46% of the diagram, or $\frac{73}{46} = 60\%$ more power is recovered from the same steam with the hot water combination than with the steam system and bleeder turbine under constant back pressure.

The power recovery is variable from 43% to 15% and will balance at only one point, in the case of a constant power load requirement, with back pressure valve and outboard exhaust. All periods below 30° outside, if this were the balancing point, would require additional live steam, and all periods above 30° would have steam wasted to the atmosphere.

It is this non-condensing operation for power in summer, fall and spring that has put the non-condensing isolated plant out of business, as well as the by-product central heating plant.

In the case of the turbine, operating at high outside temperatures, the conditions for exhaust heating are relatively no different than power generation with full vacuum, only the heating system performs, instead of the condenser.

In the use of a bleeder turbine, only a limited portion of the steam can be withdrawn, or about one-half the required power load, and it is possible the heating and power load may not co-ordinate, so that this may be economically accomplished.

The bleeder turbine is nothing but a combination non-condensing, high-pressure machine and a condensing unit. It is analagous to the method of extracting the steam between the high and low-pressure cylinders of a reciprocating engine, which was the means of misleading a lot of people into false economies years ago. The bleeder turbine has the same limitations.

There is also the item of operating the condenser on the portion of the power load that cannot be withdrawn. The machine is of larger frame and more expensive and there is no effective use of the condensing effect of the heating system. A heat balance can be accomplished, but it is one-half the power load at twice the steam rate.

A light power load, in extreme weather, would cause additional live steam to be used for heating and, at the same time, a part of the power load would be passed to the condenser.

OPERATING CONDITIONS AS TO HOURS FOR LARGE HEATING AND POWER PLANT

Large manufacturing plants and many large office buildings operate heat 24 hrs. as a matter of necessity and reduction of peak boiler loads. The electric load of large manufacturing plants would operate the maximum demand load about 14 hrs. per day, or 60% of the time.

The general saving of this diagram shows 73% in power recovery. An isolated plant could only use about 73% × 60% = 43% of the power, while a public service company, with a 24-hr. demand could use it all, or over twice as much, with the consequent saving in equipment.

PICTORIAL DIAGRAM OF THE REDUCTION IN EQUIPMENT

Fig. 3 is a diagram of the same thing in a little different form, illustrating the duplication of boiler equipment.

Plan No. 1 shows a separate plant for power generation, with cooling tower or lake, and would represent what the customer pays for when current is purchased.

The 5000 H.P. represents the customer's heating plant with a forced hot water system. This is a diagram of an actual problem here in Detroit where they are purchasing current, generating a portion and heating partly with exhaust steam from very wasteful auxiliaries which exhaust to atmosphere in summer.

Plan No. 2 is the same arrangement with 3000 H.P. in boilers eliminated. Under each plan, the maximum average and minimum fuel is given, with the probable boiler operation.

PLAN NO. 1.
INVESTMENT, FUEL, OPERATION

8000 H.P. in Boilers.
10,500 lbs. + 10,500 lbs. = 21,000 lbs. coal per hr. average.
5000 H.P. × 4 mos. = 20,000 idle B.H.P. months.
2000 H.P. × 4 mos. = 8000 idle B.H.P. months.

Total 28,000 B.H.P. months.

PLAN NO. 2
INVESTMENT, FUEL, OPERATION

5000 H.P. Boilers.
12,000 lbs. coal per hour.
2000 H.P. × 4 mos. = 8000 idle B.H.P. months.
1000 H.P. × 2 mos. = 2000 idle B.H.P. months.

Total 10,000 B.H.P. months.

SAVING OF PLAN NO. 2 OVER PLAN NO. 1
INVESTMENT, FUEL, OPERATION

$8000 - 5000 = \frac{3}{8} = 37\frac{1}{2}\%$ in boilers.

$21{,}000 - 12{,}000 = \frac{9000}{21{,}000} = 43\%$ in fuel.

$28{,}000 - 10{,}000 = \frac{18{,}000}{28{,}000} = 64.3$ in boiler equipment.

If the owner tries to recover this power, he can only obtain 14 hours' operation of the demand for 25 days to the month or

5000 K.W. $\times$ 14 hrs. $\times$ 25 days = 1,750,000 K.W.H.

This would represent in cash at Edison rates in Detroit:

200 K.W. $\times$ $3.00	=	$600
4800 $\times$ 2.00	=	9600
1,750,000 $\times$ $.009	=	15,750
		$25,950 per month
5%		1,297
		$24,653 $\times$ 8 mos. = $197,224 per annum.

This is the return as represented in cash on this operation and, in this particular plant, if the 3000 H.P. in boilers for power were swapped for the generating equipment, it would be a stand-off, as far as investment in equipment is concerned. Generally, this does not occur, as the public service company owns the generating equipment as it is installed in their plant.

If the generating equipment were 8000 K.W. @ $70, the investment required of the owner would be $560.000 and the gross return would be

$\frac{\$197{,}224}{\$560{,}000}$ or 35% gross per annum.

It would be pretty hard for the public service company to get the business, even selling current in competition with this arrangement. As this is only 60% or 70% of the current required by the owner for his plant, it would only be a step and no hardship to generate the balance at full vacuum, as the regular condensing type of machine is used to recover the power and furnish the exhaust steam for heating.

The cooling tower proposition, when water is scarce, is attractive as, during the major portion of the time, except in summer, it operates at practically no load, due to the perfect heat balance of the power and heating requirements.

The plant owner would have accurate knowledge of the steam used for heating and, therefore, of the amount of industrial steam, and absolute regulation as to the amount of heating steam used by means of recording thermometer and water meter.

One of the safeguards the public service company has on this business of these large plants is the utter lack of facility for measuring the steam used for various purposes.

Their steam heating is wasteful because there is no means of regulation except shutting off surface, which requires labor.

They know how much coal is used and generally show a very favorable evaporation factor, but they have no idea of the amount required for various functions or how much goes to the sewer.

The public service company is doing the same thing on a grand scale where, using separate generating plants for heating and power on large building units, they handle many large office buildings having 200,000 sq. ft. of heating surface, requiring 2000 H.P. for heating and probably 1000 H.P. additional for power.

SUGGESTED METHOD FOR SUPPLY OF THESE UTILITIES

It is the public service company which has the facilities for correcting this lack of co-ordination, with corresponding profit to itself and the consumer. The public service company could form a subsidiary company to handle these large installations, and arrange to have the owner install a forced hot water system for heating which would probably cost the same or less than a vacuum steam system.

The experience and engineering data for these installations are not common. The turbine engineer has no experience in heating and the heating engineer very little regarding turbine operation, while the problem requires a knowledge of both, and accurate operating data for design.

The financial return would more than warrant the possible damage from freezing and a few breaks until sufficient experience is acquired to be able to prevent them. These are the old stand-by objections to water heating systems.

HOW THE PLAN COULD BE CARRIED OUT

In the case of a large office building in the heating district a high-pressure steam main could be carried to the building capable of handling steam at a sufficient temperature to generate power. A single high-pressure turbine unit could be installed with small condensing equipment, or enough simply to control the vacuum.

A subsidiary company of the public service company would own and tend the machine during the heating season and meter the recovered current back into its own mains at high tension to be used as a general supply.

With the regulation of the vacuum and temperature, it would not be necessary to watch the owner of the building every minute and shut the steam off every time the sun comes out in order to keep the heating bills down and the heating company free from complaint on this score.

The power and heating steam could be metered and billed just as at present at the same rates.

OWNER WOULD RECEIVE MONTHLY CHECK FOR THE RECOVERED POWER

The owner of the building would receive a rebate check each month from this subsidiary company for the recovered power metered into the parent

company's high-tension mains and sold elsewhere.

This would not mean any new central hot water heating plant or any radical departure from present practice, outside of the particular building unit in question. The remainder of the district steam heating plant would function as at present.

It would save about 30% of the boiler equipment and investment required to handle the project, and these large projects must be quite a burden on the public service companies in providing capital for the equipment, as it takes years and considerable interest to amortize bond issues, and, in most cases, forces the building of new plants, at great initial outlay.

COST REDUCTION WHERE THE HEATING AND POWER ARE BOTH FURNISHED

In cases where heating and power were handled by the public service company in the manner suggested, the project would work out about as follows:

Steam for heating costs about \$1.15 net per 1000 lbs.

Current is sold for about 2c. per K.W. under these conditions of load.

There would be received for a ton of fuel converted into steam with 8 lbs. evaporation and 90% available as exhaust:

$$\frac{2000 \text{ lbs.} \times 8}{1000} \times \$1.15 \times 0.9 = \$16.56 \text{ per ton.}$$

If the minimum rate for power was 2c. per K.W., Fig. 2 gives 140% of the minimum rate as the average rate for heating and power so

$$20 \text{ lbs.} \times 140\% = 28 \text{ lbs. per K.W.}$$

$$\frac{2000 \times 8}{28} = 572 \text{ K.W. per ton of fuel.}$$

$$572 \text{ K.W.H.} \times 2c. = \$11.44$$

The total selling price per ton of fuel we have \$11.44 + \$16.56 = \$28.00 per ton, of which \$11.44 costs nothing for fuel or boiler equipment and represents the saving by this method.

If 2 lbs. of fuel were used for power at the power plant, there would be

$$\frac{572 \times 2 \text{ lbs.}}{2000} = 0.572 \text{ tons saved in fuel by the combined operation or } \frac{0.572}{1.572} = 36.4\%$$

With boiler equipment to generate the steam, the saving would be 36.4% in equipment and operation, which is quite an item in the capital account.

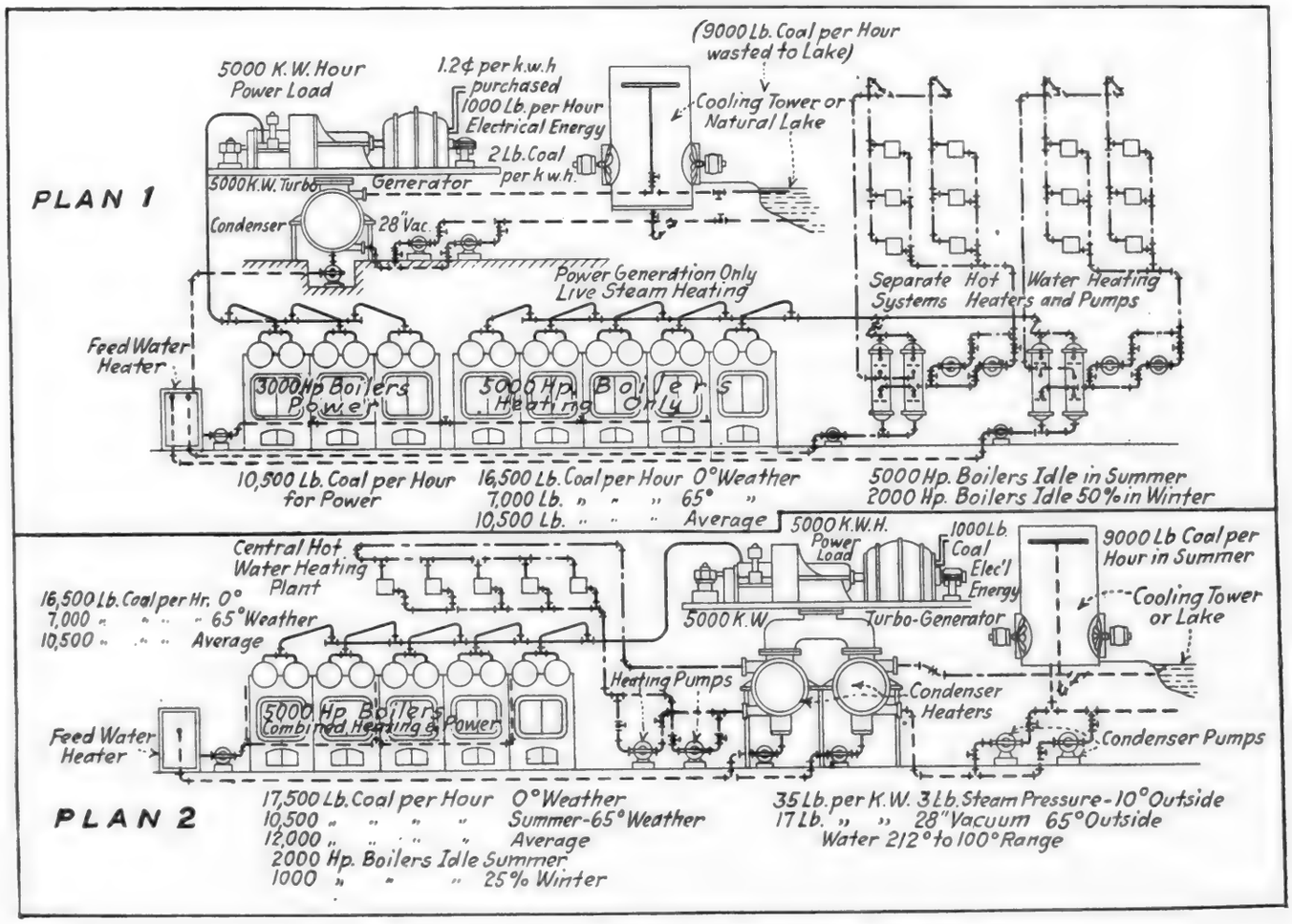

PLAN 1
5000 K.W. Hour Power Load
1.2¢ per k.w.h. purchased
1000 Lb. per Hour Electrical Energy
2 Lb. Coal per k.w.h.
(9000 Lb. Coal per Hour wasted to Lake)
Cooling Tower or Natural Lake
5000 K.W. Turbo Generator
Condenser
28" Vac.
Power Generation Only
Live Steam Heating
Separate Hot Water Heating Systems Heaters and Pumps
Feed Water Heater
3000 Hp. Boilers Power
5000 Hp. Boilers Heating Only
10,500 Lb. Coal per Hour for Power
16,500 Lb. Coal per Hour 0° Weather
7,000 Lb. " " " 65° "
10,500 Lb. " " " Average
5000 Hp. Boilers Idle in Summer
2000 Hp. Boilers Idle 50% in Winter
PLAN 2
Central Hot Water Heating Plant
16,500 Lb. Coal per Hr. 0°
7,000 " " " 65° Weather
10,500 " " " Average
5000 K.W.H. Power Load
1000 Lb. Coal Elec'l Energy
9000 Lb Coal per Hour in Summer
5000 K.W. Turbo-Generator
Cooling Tower or Lake
Heating Pumps
Condenser Heaters
5000 Hp. Boilers Combined Heating & Power
Feed Water Heater
Condenser Pumps
17,500 Lb. Coal per Hour 0° Weather
10,500 " " " " Summer-65° Weather
12,000 " " " " Average
2000 Hp. Boilers Idle Summer
1000 " " " 25% Winter
35 Lb. per K.W. 3 Lb. Steam Pressure-10° Outside
17 Lb. " " 28" Vacuum 65° Outside
Water 212° to 100° Range

Fig. 3. Pictorial Diagram of Reduction in Equipment Made Possible by Author's Plan

The saving could be divided with the owner, either as suggested by the author, or in any way agreeable to the parties concerned. The main thing being to prove conclusively it is available, and the scheme feasible.

APPLICATION TO MANUFACTURING PLANTS WHERE POWER ONLY IS FURNISHED

In manufacturing plants, where public service steam is not available, the subsidiary company could furnish and operate a turbo-generator between the owner's boilers and water heating system, metering the power high-tension direct to the company's mains as a sub-station synchronized with the main station.

One plant in Detroit has a forced hot water system and 10,000 to 12,000 H.P. in boilers for heating, all idle in summer.

They generate about 500 to 1000 H.P. for compressed air and waste this exhaust in summer, with no vacuum in winter.

In Fig. 3, we showed how the owner could possibly recover 1,750,000 K.W. units with double equipment, at $24,653 per month, or 1.48c. per K.W.H. if purchased.

If the public service company operated the turbine, there would be 24 hours' use, or nearly 100%.

$5000 \times 24 \times 30$ days $= 3{,}600{,}000$ K.W.H.

Demand charge as before	$10,200
3,600,000 K.W. @ .009 =	32,400
	42,600
5% discount	2,130
	$40,470 per month.

$$\frac{\$40{,}470.00}{3{,}600{,}000} = 1.124\text{c. per K.W.H.}$$

$\$40{,}470 \times 8$ mos. $= \$323{,}760$ per annum.

There would be no need of any double equipment as live steam could be used direct for heating, in case of shut-down to the turbine for any reason. The power for the plant would be served and charged, the same as at present.

INVESTMENT FOR SUBSIDIARY COMPANY

The investment for the subsidiary company would be $5000 \times \$70 = \$350{,}000$ for the turbine, while the public service would gain the use of possibly 3000 H.P. in equipment by the use of the consumer's heating steam and heating plant. The income of the recovered current would pretty nearly pay for the equipment the first year.

The public service company becomes a broker for this current, from heating plants where it cannot be used to points where it would be available, taking a corresponding boiler and fuel load from the main plant.

It is impossible for the consumer to do this as he would require double equipment with only a 14-hr. day load. Under the scheme suggested, there is no investment in equipment required of the consumer and a substantial check each month, almost equal to the amount he could save by handling this power himself.

SUGGESTION AS TO THE DIVISION OF THE SAVINGS

Note that the unit rate, where the customer buys what he could recover, is 1.48c. per unit, while, when the public service handles the business, the rate is only 1.124c. per K.W., due to more extended operation.

The following is suggested as to how this plan could be handled and the money divided:

The parent company would have no concern or investment other than the distributing system and would receive the price of the current generated in this manner, the same as at present.

Part of the profit to the parent company would come from the difference in rate between the purchase price and the various selling prices due to consumption. Suppose it was sold at an average price of 1.8c. per unit, there would be a profit on the 3,600,000 K.W.H. of 1.8c. — 1.124c. = 0.676c. $\times$ 3,600,000 = $24,336

$\$24{,}336 \times 8 = \$194{,}688$ per annum—a neat little profit.

If the subsidiary company received 1.124c. per unit from the parent company, it would be:

	$40,470 per month
If the consumer received 0.5c.	18,000 per month
	$22,470 per month net income.

$\$22{,}470 \times 8 = \$179{,}750$ per annum, or 50% of the investment at, say, $350,000.

Part of the profit would accrue to the public service company through stock ownership as it may elect.

In case the agreement should be terminated at any time, the machine and equipment could be moved elsewhere, as it will be found that three or four sizes of units will take care of all conditions. These machines would be the simple high-pressure condensing type, with high-tension generators.

We have already shown that the customer should recover $24,653 per month or $197,224 per annum with an investment of $560,000, and he ought to be pleased with no investment and $18,000 per month or $144,000 per year. It will be found there will be comparatively few plants of this type available in the ordinary city, but the profits of this arrangement will be very gratifying.

Separate heating and power arrangements are very wasteful for everybody and there is no good reason for it. Small units for heating and power should be handled as at present.

All computations in this article are generalized for simplicity and are meant to prove the general question of the advantages of exhaust steam heating by the methods suggested.

The mistake in the past has been the modification of the generating equipment to suit the non-condensing exhaust steam system, instead of modifying the heating system to function with the modern condensing turbo-generator.

The logical people to solve this problem are the public service companies, applying the same principles of the super power system to the various large commercial plants and large buildings.

Due to the conditions enumerated, the public service companies have enjoyed a comparative freedom from serious competition. The methods here enumerated have been in existence for 15 years, but not generally known except in an abstract manner.

The public service company will shortly be up against this competition. There is one large plant known to the writer, which is being revamped along these lines. The public service company, as soon as the plant operatives get wise to the economies, may possibly lose about $80,000 worth of business a year. By the above methods, they stand a good chance of legitimately retaining the business and controlling the situation.

It looks like a get-rich-quick proposal, but, when consideration is given to the fact that only the investment for single generator equipment is required and boiler operation and coal is already provided under cost and selling price of the former methods, the emoluments will not seem so improbable of realization, especially if the heating system is properly designed.

There are many central heating plants for large buildings and institutions where the heating load is continuous and of great extent, while the power load is small, intermittent and of short duration. These include college buildings, asylums and hospitals. The arrangement here described would relieve them of all care of power generation, with the attendant investment for generating equipment. The return in by-product current would largely pay for their heating operation.

RATE CHANGES DECLARED NECESSARY IN GAS SERVICE

The extension of gas into the industrial and commercial field, such as house heating, refrigeration, metal melting and other installations, makes scientific rates for gas and public service commission control of paramount importance, according to Geo. B. Cortelyou, president of the Consolidated Gas Company of New York, as reported in *Gas Progress*, published by the American Gas Association.

Stating that the old "flat rate" for gas worked very well when gas was used for but one purpose, lighting, Mr. Cortelyou says that today it is a brake upon the development of gas service along economic lines under present-day conditions of diversified use.

"Before gas can reach the point of fullest utilization, it must be freed of certain legislative restrictions that still hamper it in some places," he explains. "The 'flat rate' should be eliminated and gas companies, under proper supervision of public authority—that is, the public service commissions of the various states—should be permitted to adopt rate schedules that are sufficiently flexible to allow an equitable allocation of charges among the several classes of customers. Then one class will not be penalized or favored as compared with another, and each will have a rate that encourages the maximum use of gas service.

"The same is true of standards of quality. These, like the approval and fixing of rates, should be left to the state commissions, created for this purpose."

Heating and Ventilating Chicago's Newest Hotel

(Continued from Page 73)

bined condensate to a heavy-duty trap located at some easily accessible point. (See Fig. 8.)

PURCHASED POWER

It is interesting to note that the new Palmer House purchases all its electrical energy for power and lighting from the Commonwealth Edison Company. Very few large Chicago hotels have ever followed this practice, but the decision was made after a thorough study of the load conditions of winter and summer, the investment, and the available space.

In telling the story of this notable project in heating and ventilating, only the broad generalities and a few specific details of unusual interest have been treated. Material for several text books might be gleaned from a thorough study of the details of ducts, piping and apparatus layout.

New Home-Study Course in Gravity Steam and Water Heating

(Continued from Page 75)

sufficient air and water have collected to cool the element enough to cause it to contract and open the outlet into the return.

Data on traps of this type as built by three manufacturers are given in Tables S-6-4, S-6-5 and S-6-6 as samples only.

Work Problems S-6-3, S-6-4.

The float mechanism type closes against steam by means of a water seal. Air may rise in an annular space around the float and then flow down into the return, this space being always open except when water of condensation enters the trap and rises high enough to raise the float. Through the center of the float there is a tube to which is attached a plate. When the float has risen to a proper point, this plate seats a valve against the air outlet in the top and simultaneously lifts a valve in the bottom, permitting the water to flow out until the float again assumes its low position.

(To be Continued)

Equipment of World's Largest Telephone Building

Outline of Installation in the New York Telephone Company's New Home Housing Six Exchanges and 6000 Employees

IMMEDIATELY after the close of the World War, the demand for additional telephones in New York City, and adjacent New Jersey and Connecticut reached unprecedented bounds. It was as a direct result of this situation that the New York Telephone Company decided to solve the difficulty by erecting the largest telephone building in the world.

For this purpose the company selected the location at 140 West Street, between Barclay and Vesey Streets, facing the Hudson (North) River, and systematically began a project which, in some respects, has no equal. The completed building, as it stands to-day, covers an area of 200 ft. x 250 ft. and has 32 stories above ground, with five stories more below the street level. It has been designed to accommodate 6000 telephone workers and six central exchanges, capable of serving 120,000 subscribers.

Fig. 1. New York Telephone Building, West Street, New York

SPECIAL PROBLEMS

As might be supposed, the heating and ventilation of such a special structure involved new and interesting problems. The length of life of delicate and intricate mechanical telephone apparatus is

Fig. 2. Boiler Room Showing Ventilation Ducts, New York Telephone Building

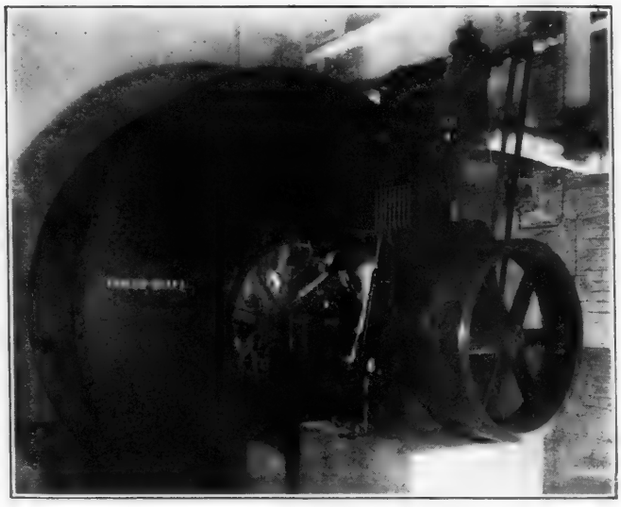


Fig. 3. Forced Draft Fan, New York Telephone Building

largely determined by the maintenance of certain required atmospheric conditions, among which are even temperature, dryness and adequate ventilation.

BOILER PLANT, COAL AND ASH HANDLING

The boiler plant for the building consists of four Babcock and Wilcox boilers, each of 350 H.P. and producing live steam at 75 lbs. gauge pressure. The major portion of the steam is then passed through Atwood and Morrill pressure-reducing valves, one of which reduces a portion of the steam to 35 lbs. gauge pressure for use in heating hot water for the kitchen and washrooms. A second reduces a portion of the steam to 2 lbs. gauge pressure for use in the Vento heaters, and a third reduces the pressure from 75 lbs. gauge to 2 lbs. gauge, for use in the heating system when required.

The boilers, when run under full load conditions, will consume between 30 and 40 tons of coal per day, the coal being stored in three bunkers holding a total of 1500 tons. The coal is fed through hoppers, with grates, into a coal car running on a truck immediately below the hopper. The car is then drawn along until it reaches the proper position in front of the furnaces and delivers the coal to the stoking force ready to feed the fires.

Ash handling is taken care of by means of electric-driven trucks upon which the ashes are placed, in the usual ashcans, and which deliver these cans to the large ash vault. At the time of collection, the cans are shot up to street level by means of special ash elevators and left on the sidewalk ready for removal by the city trucks. The boiler plant is normally operated with natural draft, but forced draft is always available if required, being supplied by means of a Sturtevant blower operated by a Sturtevant vertical engine.

VACUUM HEATING AND PUMPS

The steam supply to the building, after being carried through the reducing valves so as to reduce it down to 2 lbs. pressure, passes through a low-pressure heater and then into two 20-in. vertical heating mains, the first main carrying all floors up to, and including, the seventeenth, and the second main, all floors above this.

The heating system for the building is a vacuum system involving about 3000 radiators, to which steam is supplied through packless radiator valves, and the air and water allowed to escape through Webster thermostatic radiator traps.

The return piping is carried back and connected to three 10 in. x 14 x 18 in. Worthington vacuum-return pumps, which pump the condensate through the special water heater, after which it is picked up by two 10 in. x 6 in. x 10 in. Worthington boiler-feed pumps and returned to the boilers against the 75-lb. pressure there maintained.

In connection with the vacuum pumps there is installed an oil separator to remove the oil from the water, and three 6 in. x 4 in. x 6 in. Worthington dirty-drip pumps are supplied to draw the oily water out of the system and to discharge it into the dirty-drip tank.

SPECIAL HEATING IN CORRIDORS

A special method of heating in connection with the ventilating system has been installed for the first-floor main corridor, this being a recirculating system, with the air drawn through fans and tempering coils from the perforations in the sides of the ceiling beams and brought out again near the floor in the main corridor. The temperature of the air is regulated by means of thermostats, with pneumatic remote control on the heating coils, the essential difference between this system and those generally in use in other large buildings lying in the fact that the air is mechanically recirculated.

No radiators have been used in the main corridor, but radiators have been placed in the elevator corridors opening off the side of the main corridor so that additional heat can be obtained, if desired.

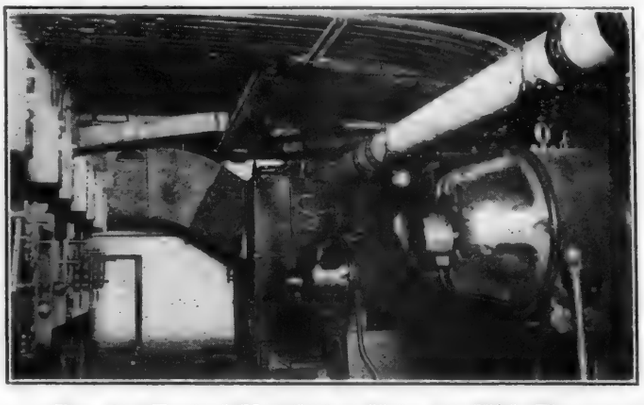


Fig. 4. Typical Ventilating Units on Fifth Floor, New York Telephone Building

VENTILATION OF A MILLION CUBIC FEET PER HOUR

The ventilating of the building involves handling over 1,000,000 cu. ft. of air every hour, this being divided up among 54 Sturtevant fans, with a total of over 360 H.P. to operate them. The *general* method of ventilation in this building is quite similar to that used in other large buildings, the fresh air being delivered at the ceiling and the foul or exhaust air being drawn off from exhaust registers located either at the floor or ceiling levels. For all floors below grade, Midwest metallic oil-treated type of air filters are used, fresh air for these floors coming from the Barclay Street side of the building and being delivered to the basement through vertical air shafts. In the basement, the air passes over Vento heaters and is delivered to the supply registers through a system of ducts. The exhaust air is withdrawn from these rooms and is exhausted above the eighteenth floor. All the fresh air supply for the third to tenth floors, inclusive, comes from the two courts at the eleventh floor.

LOCATION OF FANS

Fans, both supply and exhaust, have been installed on each floor from the third to the tenth, on the mezzanine floor and on the 32nd floor. Fans are also installed on Floor A below grade, on second floor and on the 31st floor to take care of the kitchen, store quarters on the ground floor, the auditorium and two main entrances. In addition, separate exhaust fans have been located on the 14th, 15th, 16th and 32nd floors to take care of the blueprint room, the medical department and the kitchen.

WASHROOM, VENTILATION AND UTILITY CORRIDORS

The ventilation system installed in the Barclay-Vesey section, to care for the washrooms, is quite unique. Fully 90% of these rooms have no communication with the outside air and the vertical utility corridors on the sides of the washrooms, in which the plumbing piping, valves and access space are located, have been here utilized as an exhaust duct to ventilate these rooms.

In order to care for the support of workmen making repairs at various levels, a system of gratings or platforms is employed at each floor level, the openings allowing the air to pass on up the shaft. The foul air from the toilets is carried in small ducts over to the utility shaft and passes up through the shafts to exhaust fans located on the 32nd floor and thence out through exhaust heads on the roof. Fresh air to the wash rooms is introduced through louvres in the doors.

The architects for this imposing structure are Messrs. McKenzie, Voorhees and Gmelin. The consulting engineers are Moran, Maurice and Proctor; Meyer, Strong and Jones; Todd, Robertson and Todd and H. G. Balcom. The heating and ventilating contractor is Baker, Smith and Company of New York.

Further Research Work by New York State Commission on Ventilation

IT IS interesting to note that further experimental work is to be undertaken by the New York State Commission on Ventilation. The commission is maintaining the same personnel as before, excepting that the secretary is Thomas J. Duffield, of 370 Seventh Avenue, New York. This work for the next two years is to be concentrated upon rural schools and is made possible by receipt of additional funds from the Milbank estate, which provided the funds for the original work undertaken by the commission several years ago.

It is planned to spend about $3000 in Cattaraugus County and $2000 in Syracuse this year and $2000 in Cattaraugus and $3000 in Syracuse next year, after which the scene of operations will be transferred back to the metropolitan schools, probably in New York City.

COMMISSION'S EXPERIMENTS STILL INCOMPLETE

The commission fully realizes that the experimental work carried out during the first period of its existence was not brought to the point of completion and finality which it should have reached. This, of course, was due primarily to the exhausting of the finances allotted to the commission for this work at that time and, later, to the war intervening to prevent further research work.

Since the war, however, a disposition has been displayed in several quarters to exaggerate and overdraw the very diffident and modified conclusions (which were frequently covered by various reservations) arrived at by the commission as a result of its experiments as far as they were completed. Many seem to have forgotten the reservations altogether or apparently have picked out only certain statements which, taken by themselves and without correlation to the adjacent and pertinent portions of the text, ostensibly have given color to a general approval of the window method of ventilation.

The very fact that all the members of the commission, after going over their own tests, have not arrived at exactly the same conclusions should be ample evidence that the tests themselves were incomplete and inconclusive.

The commission is re-undertaking its experiments, not so much along the line of the quality of air and its characteristics as along the angle of the effects on the individual of the various methods of ventilating. The work of the commission will be followed with the greatest interest and concern by all interested in the subject of schools or ventilation in general.

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IN THE scramble for dominance in the house heating fuel field, the activities of the coal, gas and oil interests are rapidly taking on all the characteristics of a real "hoss race". From a spectacular standpoint, the oil people have held the spotlight so long as to appear to have a commanding lead in the present movement. But now the gas industry is giving every indication of being thoroughly awake to the trend of events and is girding its loins for the impending struggle. At Atlantic City last month the most ambitious program ever offered for the promotion of gas house heating was embodied in the report of the House Heating Committee of the American Gas Association. Every phase of the problem was discussed, from the establishment of a reasonable rate for this service to ways and means for filling the summer load "valley" that would follow any general adoption of gas as a house heating fuel. In addition, a huge advertising campaign is contemplated to further the use of gas. In this compaign the preliminary survey alone will entail an expense of $14,000.

George B. Cortelyou, a past president of the American Gas Association, epitomized the situation when he declared, in an opening address at the convention, "We must capture the heating business of the nation."

George K. Burgess, director of the Bureau of Standards, after cautioning the industry that gas rates cannot be lowered materially or great plants built until a greater market is developed, and that it will require unusual vision if the gas industry is to realize its slogan of "Gas, the Fuel of the Future," went on record as stating that the fuel needs of a city could be met with gas at a saving over the total cost of present fuels, if the gas industry can provide complete manufacturing and distributing equipment at one time.

AS FOR the coal interests, instead of meeting the issue squarely and confining its efforts to the very real advantages to be derived from the use of hard coal, especially the smaller sizes, there appears to be a feeling on the part of the anthracite industry that the cause of coal would best be served by savage attacks on oil burning. Doubtless, when the gas menace becomes equally threatening, we may expect to see the fancied dangers of this fuel held up to public notice by the coal operators, all in the name of "giving free engineering advice to those seeking information on the economical use of anthracite coal for heating and power purposes." In view of the records being made, especially in the field of domestic oil burning, some of these attacks border almost on the grotesque; they can hardly fail to prove a boomerang which will have an effect quite the opposite of that intended.

To select one, which is quite typical of them all, and which is discussed on another page of this issue, the fact that the attack appears in *Anthracite Coal Service*, an official publication of the hard coal operators, makes it fair to assume that it expresses their policy in this particular regard.

IT MAY be well at this time to emphasize again, as clearly as we can, the disinterested attitude of THE HEATING AND VENTILATING MAGAZINE towards coal, gas and oil. The heating industry can easily adapt itself to any one or all of these fuels; the work of the heating engineer and contractor will go right on, whichever fuel gains the ascendency. It has been a plain duty to acquaint our readers with the sensational advances made in the field of domestic oil burning. With gas house heating making the same bid for popular favor, it is equally our duty to keep our readers advised of the facts. At the same time, there is no disposition to belittle the merits of coal, as witness the series of articles now appearing on designs of grates especially adapted to burn the smaller sizes of anthracite.

THE HEATING AND VENTILATING MAGAZINE appreciates the unique position in which it is placed as an impartial observer of the three-cornered competition now in progress and can echo with sincerity the cry of the Irishman on a somewhat similar occasion, "Good luck to ye all and may the best mon win."

Gas Men Laying Plans to Capture the Heating Field

Measures That Are Being Taken to Fill the Summer Load Valley and Thus Make Possible Lower Rates

NOTHING less than the conquest of the entire heating field is included in the ambitious program that is being laid out by the gas industry. How far this movement has advanced, the difficulties still in the way and the means that are being proposed to overcome them, occupied a prominent place in the discussions at the convention of the American Gas Association in Atlantic City, October 11-15. An entire session of the convention was devoted to house heating and allied topics.

A feature of this session was the presentation of the report of the House Heating Committee, of which H. Leigh Whitelaw was chairman. This report, under the general heading of "Selling Gas for House Heating," included a number of sections, covering such items as "Factors That Govern the Market for House Heating", "What the House Heating Business Means to the Gas Company", "Governing Factors of Methods of Selling House Heating" and "Miscellaneous Data." In the section devoted to "Governing Factors of Methods of Selling House Heating," a discussion was presented by G. V. Carnahan and H. V. Johns, of the Peoples Gas Light and Coke Company of Chicago, on "Selling Insulation for Better Heating Economy" devoted especially to the use of insulating material in the building of houses.

An interesting chart presented in the report was intended to show the income necessary to justify an owner in adopting gas heating. In this chart, the horizontal scale was used to indicate annual income in thousands of dollars, while the vertical scale showed the amount of radiation in the residence, expressed in equivalent square feet of steam radiation and also in B.T.U. required in the gas per season. It was assumed that 1000 cu. ft. of 550 B.T.U. gas would be consumed per square foot of equivalent steam radiation per heating season. This made it possible to translate square feet of radiation into gas consumption for the season and also, the total B.T.U. in the gas. Another assumption was that 6% should be taken as the allowance in the family budget, which might be made to cover all operating expenses chargeable against the heating of the house. In the case of coal, this would include not only the bare cost of the fuel itself, but the cost of attending the furnace, removing the ashes and cleaning the house. In the case of a gas boiler, the whole 6% might be devoted towards the purchase of gas, as this would be practically the only operating expense.

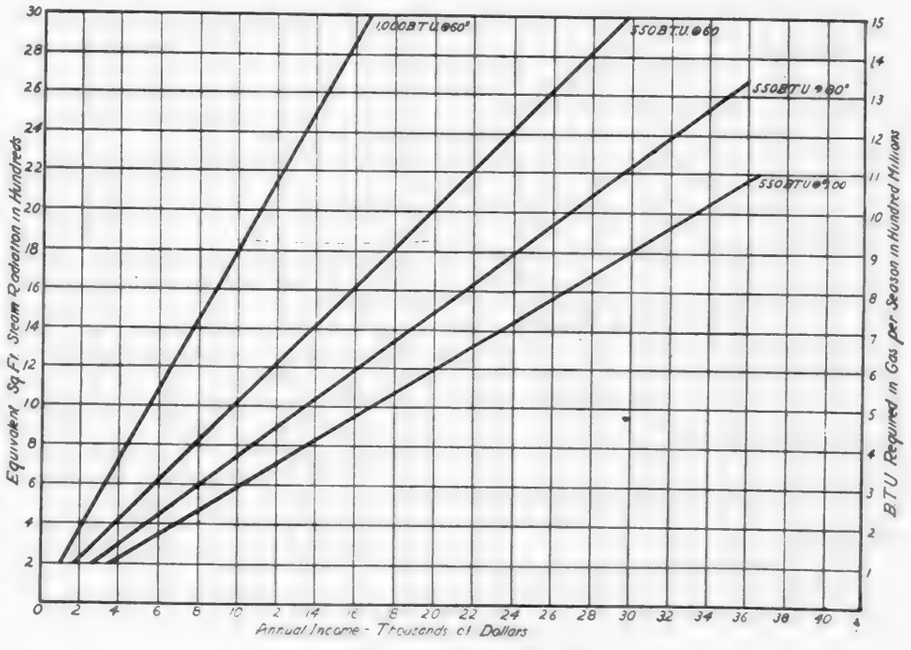
To illustrate the use of the chart, a case was taken where a man has a house containing 600 sq. ft. of steam radiation and 1000 B.T.U. natural gas available at 60c per 1000 cu. ft. In that case, his income need be only about $3400 to make him a prospect for gas heating. On the other hand, if the owner of this same house with 600 sq. ft. of steam radiation lives in a community where 550 B.T.U. gas is available at 80c per 1000 cu. ft., his income should be $8000 per year.

Effect of Geographical Location and Climate on the Extent of the Market for Central Gas House-Heating Equipment

In this section of the report, prepared by Thomson King, of the Peerless Heater Company of Pittsburgh, it was shown that so far as the gas company is concerned, the field for heating is widened most by a climate which insures a good load factor in the gas sent out for heating, whereas, as far as the individual is concerned, the climate having fairly wide variations of temperatures and a number of days, or parts of days, when heating is not needed, will have the greatest effect. These are somewhat contrary effects and to some extent tend to neutralize each other.

As an estimate of the number of families comprising the market for house heating equipment, the statement is made that the greatest potential market for house heating is among families of moderate means, with incomes of from $5000 to $15,000. Most of these families own homes on first and second mortgage, purchase automobiles and household equipment on time payment, carefully budget expenditures and succeed in saving a small sum each year.

Home ownership with them means a responsibility, a duty and usually, a pleasure. They are, for the most part, sold on the idea of labor-saving devices, adequate lighting and electric wiring, good building materials, heating and plumbing, in so far as national advertising has succeeded in influencing them in this direction. Such families of the character of home ownership thus indicated are given as the most logical and active prospect for the sale of central house heating with gas, provided the story of gas heating is carried to them, with the same vigor, effectiveness and persistency as marks the consistent activity of the present manufacturers of household equipment.

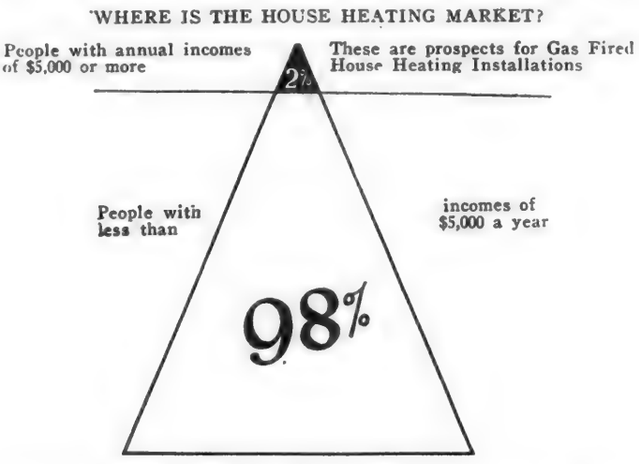


Income Necessary for Gas Heating

Assumptions: 6% of Income to Heating. 1000 Cu. Ft. of 550 B.T.U. Gas per Square Foot of Equivalent Steam Radiation per Season

Counterbalancing House-Heating Load Peak

In discussing the measures that are being taken to counterbalance the house heating load peak, G. E. Whitwell, of the Byllesby Engineering and Management Corporation, described an investigation he has been making in connection with a trip extending from the Middle West to the Pacific Coast, in which he sought the answer from gas company operators and officials to the question, "What can be done by gas companies to fill the summer load valley that has resulted from a considerable house-heating load, or will result if such business is aggressively sought?"


WHERE IS THE HOUSE HEATING MARKET?
People with annual incomes of $5,000 or more
These are prospects for Gas Fired House Heating Installations
2%
People with less than
incomes of $5,000 a year
98%

Analysis of House-Heating Market Based on Income Tax Reports Covering 38,000,000 Persons in the United States

The answers which were received varied greatly.

Somewhat naturally, perhaps, the subject of refrigeration with gas was usually the first possibility discussed. Almost invariably the following thoughts were brought out:

1. At the present time the gas refrigerator has not yet reached the stage of practical development where any immediate considerable load will result.
2. Such refrigerators will probably be on the market soon.
3. When they are, too much hope of a high concentration of summer gas load is probably not justified, for it is likely that domestic refrigeration will be against house temperatures of approximately 70° F. rather than outside temperatures, and it is, therefore, possible that the business will not have a good annual load factor.
4. If such a condition is only partially true, it will still be difficult to conceive of refrigeration as materially affecting the summer valley for some time to come because of the relative smallness of the individual refrigerating load when considered in connection with the peak day or peak hour load of a total house heating system.
5. Refrigeration will provide the gas industry with a most desirable volume of business, and will be a distinctly valuable asset, but it does not now provide a solution to the summer valley created by house heating.

While it is probably, at least for the present, of limited application, it is not unnatural that, in certain localities, mention was always made, in connection with refrigeration, of the possibility of domestic and industrial air conditioning. It is, indeed, a pleasing and not altogether fanciful thought that the fuel that will maintain the house temperature at 70° F. during the winter will be employed to accomplish the same end during the summer. Such summer air conditioning, in homes, however, must be classed with the luxuries, and even then will have application of any moment in but a small area in this country. Industrially, it offers a market for gas in a highly-competitive fuel field; it is far from impossible that some business can be obtained, but it is unlikely that enough will be found soon to materially affect the annual load factor.

There is always one summer gas use which comes immediately to mind; namely, water heating. Statistics abound to show that the percentage of saturation of this business in any community always falls short of 100%, and in some localities is very low indeed. This is a real off-setting load to house heating. It can be obtained. But here, again, in cities where a relatively large amount of both water and house heating has been obtained, it is found that the former, even though used by many, does not total enough business to materially aid in balancing the large house heating demand of relatively few. About the most that can be said is that water-heating helps and is attractive business which should be aggressively sought.

Other distinctly summer loads come to mind as characteristics of individual local conditions. In general, though, the total of the business thus obtained, while desirable, fails, like water-heating, to provide a solution to the summer-valley problem.

Discussion of the problem, therefore, always turned to other means of improving load factor as, for example, (1) increasing the total annual consumption with business equally spread over the year, or (2) decreasing the amount of fuel required to do the same amount of space heating, or (3) utilizing the plant equipment necessary to meet the peak demand in off-peak production of some material in the manufacture of which gas plays an important part.

All of these points are thoughts worthy of consideration, but after weighing their merits it has been generally thought that, while each one helps, none or the combination of all of them will, in the immediate future, successfully or anywhere nearly completely off-set the house heating peak.

In the matter of a large increase of business evenly spread over the year, reference is made, of course, to the so-called industrial load—a very valuable business, but one which serves rather to increase the base load and thus improve the annual load factor than, except in a relatively few cases, fill the summer valley. Its chief asset to the gas industry is that, by providing volume, it tends usually to decrease costs per thousand feet of gas made and distributed.

Attempts to decrease the amount of gas needed as fuel to heat a given space are taking the form of better equipment, better installations, and better insulation. As such they materially decrease the cost of house heating with gas but, in so doing, only tend to increase the number of customers to whom gas house heating is a possibility. It is not at all impossible that such means in the long run will increase rather than decrease the total maximum demand and the summer valley will only become more pronounced.

USE OF IDLE PLANT CAPACITY FOR MANUFACTURE OF OTHER PRODUCTS THAN GAS

The use of idle plant capacity for the manufacture of products other than gas is most intriguing in contemplation. Considering only the possibility of motor fuel, it has been estimated that by processing water gas, the idle water gas capacity in the United States would have supplied the equivalent of 13% of the 1924 gasoline consumption. Synthetic motor fuel from water gas brings to the mind an entirely new aspect to the gas house heating business. Such a business, however, still requires a process capable of making a sufficiently cheap competitive fuel. It offers no immediate means for providing summer-plant use and no means at all for equalizing distribution load.

So the question asked of gas men throughout the middle and far West remains unanswered. Not so, however, the desirability of seeking gas house-heating business, for most of these men have come to the following present conclusions:

1. Let the gas industry know its costs for serving various classes of customers, and
2. Sell gas for house heating, as for domestic, commercial, and industrial uses, at prices and with simple rates that will, on the average, bring a fair return on whatever production and distribution capacity is needed.

It is rare indeed to find a utility that so keeps its accounts that accurate knowledge of the cost of service, by groups of customers, can be had. Some companies stand out in having made significant progress in ascertaining these costs. Three-part, or, better yet, four-part analyses have been made and the results incorporated in the rate schedule. Generally, however, it is not thought that rates for house heating are what they would be if costs of service were better known.

Where these costs are known and, based on them, a simple, practical, workable rate has been evolved, it is not usually found that the cost of house heating with gas is so great but that many customers can avail themselves of it. They are willing and able to pay for it as a home comfort which they do not care to do without; the gas company need not be concerned more with the summer valley than to do all in its power to partially fill it by whatever means may be locally available. For, if costs are known and proper rates are made, gas house heating is now a profitable venture for both company and customer.

Factors That Govern Sale of House Heating

Under "Governing Factors of Methods of Selling House Heating," Mr. Whitwell stressed the importance of complete co-operation with the heating industry and among the advantages of such a policy, he mentioned the following:

1. Complete control of all factors governing the installation of a gas boiler, such as survey of the job before the installation is made to determine if radiation is sufficient and if the right size of boiler is selected.

2. Location of job. Protecting the gas company against an installation being made where its main capacity is insufficient to handle it satisfactorily.

3. Cost estimates of fuel consumption protecting the gas company against high bill complaints and loss of goodwill.

4. Control as outlined above insures the maximum protection to the gas company, heating contractor and owner, and provides the gas company with unusual powers to enforce correct heating standards.

For the Owner

1. The owner is insured of the selection of the right size boiler or furnace to handle the load under the supervision of the gas company which is primarily interested in the successful operation of the plant in every way.

2. The owner will be able to enjoy this wonderful heating service due to the supervision of the gas company which would prevent a heating contractor from putting in insufficient radiation and insufficient boiler capacity.

3. The owner or architect is assured of receiving a standard of heating service which up to the present time is practically unknown in the heating industry.

For the Heating Contractor

1. The heating contractor is protected against unfair competition.

2. His profit on the boiler or furnace is assured.

3. He is relieved of service and callbacks that he has with all other types of heating equipment, and for which he can make no charge, which simply emphasizes the necessity for his co-operation with the gas company in order to enjoy the protection provided by this co-operation.

An interesting example of the above policy is the experience of the Stamford Gas & Electric Company whose plan is outlined in the facsimile of a public announcement made recently to its customers and reproduced herewith.

To those who believe it difficult to secure the co-operation of the heating trade, it will be of interest to know that the eighteen leading contractors of Stamford who are now assisting the gas company, paid, collectively, $260 in cash towards defraying the cost of the campaign in question.

Summing up it may be said that any practical plan based upon local conditions, which will lead to mutual co-operation between the gas company and the heating trade, along the general lines outlined, is the foundation upon which the successful sale of house heating very largely rests. Departure from such a policy, however remarkable and successful in the writer's opinion, are exceptions that prove the rule.

How Much Selling Effort Is Required to Sell House Heating?

Development of house heating by gas, it was brought out by A. M. Karshner, of the Consolidated Gas Company of New York, has gone along to a point where some analysis can be made of the sales effort necessary to obtain this business.

The belief that the gas companies will have to take this business, whether they want it or not, can be dismissed with the thought that there is no gas sold for any purpose at the present time that has not required intensive and intelligent sales effort. The fact that the advantages of gas for so many purposes have been and are obvious to the gas man himself, is not proof that these same advantages have simply occurred to the layman, who is the purchaser of gas. It is obvious to the gas man that a gas range will cook food for the housewife with less labor, more quickly, more evenly, with more cleanliness and actually more cheaply, even considering bare fuel costs, and yet it has taken the gas industry at least 40 years to approach the point of saturation for the use of the gas range and there are still thousands of homes over the United States where coal is used for domestic cooking in spite of the advantages of the gas range.

Gas house heating, if thoroughly analyzed, is not more advantageous to the customer than gas cooking, but on a bare fuel cost basis it is more expensive to the customer than the use of coal or oil. Can anyone dare to predict how many years it will take before even 10% of the entire domestic heating load will be obtained by the most intense sales effort? Unlike domestic cooking, gas will always be more expensive than coal for house heating, and nobody can say at this time how long it will be before heating with oil approaches the price of heating with gas. Rates will have to be made by individual companies which will show them a profit on a six months' load factor, with a further consideration of plant capacity to care for perhaps only three or four days of intensely low winter temperature.

The above points are mentioned simply as an argument against a prevalent idea that house heating is going to come to the gas industry faster than it can be taken care of. If it does, it is the first time in the history of the gas business that increased gas sales have come without effort, and in all other branches of our gas sales, the possible sales resistance has been less than is shown by thorough analysis when we consider the house heating business. Therefore, we will proceed on the assumption that extensive sales efforts will be required to obtain this business; that its desirability will be taken up by each individual company and rates made for compensating load in the off heating season; but possibly never, if there is to be profitable progress, will the rates be as low as those allowed for a steady, all-year class of business.

In order to sell gas house heating, it seems to the committee that the following classes of individuals must be sold concurrently.

1. Gas company employees
2. Architects
3. Builders
4. Steam fitters
5. Gas consumers

1. Gas company employees, unfortunately, do not always realize what their company is selling. Their main idea seems to be that the gas company is selling gas at $1 per thousand cu. ft., or whatever the rate may be. If we wish to obtain the most out of our business, we cannot stop at selling gas at so much per thousand. When we sell a gas range to a customer, we sell personal comfort. We sell absence of coal and ashes and labor incidental to them.

The customer pays us for domestic help which he would otherwise have to purchase. He pays us for insurance that he will have a ready supply of fuel. He pays us for well-cooked foods. All these things the customer gets when he uses a gas range and although the price is measured in thousands of feet of gas used by the range, yet the service is the important thing he does pay for. Employees must realize that gas house heating, although it may cost a customer $400 for heating his home as against $100 for coal in bare fuel costs, yet the other items which he gets from the gas company in addition to the actual gas are worth far more than the $300 and could not be purchased in the open market for $300. A prominent gas company, whose biggest year of development has been 1925, states that its house heating effort did not show satisfactory results until it had educated its own employees to what gas heating would do and what it would bring the customer besides the actual gas sold. An employee must be a booster. He meets architects, builders, steam fitters and many customers, and if he is not sold, a slight word or even a frown when the subject is mentioned, may lose a possible customer.

2. Architects: In a large percentage of instances, the architect is the sole judge of the method of heating the home, and in many other instances his advice is most important. How many architects in this country are today sold on house heating with gas? How many of them have analyzed the advantages of house heating with gas? How many of them have considered insulation in its relation to either coal or gas fuel? The architect has been designing homes with coal fuel for a great many years. How much effort will the gas industry have to make in order to get the architect to study a new line of activity; to realize what can be done with a home where gas is used for heating? He will have to be sold on all the things which his customer purchases from the gas company besides the bare thousand cu. ft. of gas. Will he have to be sold to the point where he will install a gas heating plant in his own home before recommending it to any of his clients? In our opinion, he will. He will be sold by intensive national advertising; by a folder designed for his files which will contain full information, specifications, etc.; by personal contact of the house heating representative of a company and by consumer demand which the gas company may create and which will be mentioned later. How many of us have personally visited architects' offices for interviews? A good architect is always a busy man. His work is greatly one of study. He does not like to be interrupted. Thousands of people are calling on him to introduce to him new methods and materials. Gas house heating is only one of the thousands. Great effort certainly will be required to sell the architect and he must be sold before there is much progress in the aim to sell more gas for house heating purposes.

3. The builder is about equally important with the architect when we consider the effect of his opinion on the ultimate consumer. He, too, has been installing coal heating plants for years. He has to be sold the information of what the customer's dollar buys when he buys gas. He has to be sold insulation and, further, he has to be sold good construction. Insulation and good construction, in a great many instances, will have to be sold to the builder by consumer demand as both of them mean higher initial price homes. The advantages of such homes must be sold by the gas company to the ultimate consumer so that the consumer demand will be created.

4. Steam Fitters: Practically no gas companies make steam or water connections to house heating boilers. There is a third party present in practically every deal between the gas company and the customer, and he is the steam fitter. A great many people who realize the importance of purchasing certain advantages and comforts and are willing to pay for them, have their own steam fitters whom they have used for years. Regardless of the intensive gas company sales effort used on one of these customers, when he makes up his mind, he does it only after consultation with his steam fitter, and the steam fitter must be sold just as the employee, the architect and the builder are sold. His trade depends on his advice, and it is safe to say that nine out of ten steam fitters in this country today will answer any query about gas house heating with the simple statement that it is too expensive. We must show the steam fitter that his customer will get more than he pays for in the way of comfort and other advantages. We must further show him that it is to his practical advantage, after he once believes in house heating, to push it extensively, as it will return to him legitimately earned dollars which we would have no other chance to earn. In all the millions of American homes, where coal is now in-

An Important

ANNOUNCEMENT

to the people of Stamford about house heating with gas

This is the most important message we have ever written to our customers. It's about the biggest and most interesting thing in heating.

It may seem unusual to think of heating homes with gas. Yet it was not very long ago that most of us gave up cooking with coal and installed gas ranges.

Now Practical

More than 15 years of intensive study by gas company engineers and manufacturers has extended the application of gas so that it now becomes possible and practical to heat buildings by gas with efficiency and convenience unheard of in any other method. Today in homes in all parts of the country, there are a hundred thousand gas fired central heating plants, not counting small space heaters such as: radiant fires, gas logs, gas radiators or other such appliances. At least ten thousand new installations of gas heating systems are going into American Homes every year.

Gas Heating Tried and Proven

Gas heating therefore is not new. It is simply a new use of one of the oldest fuels made. And it is a tried and proven means of heating as indicated by its widespread use.

The Local Situation

The local situation in Stamford makes it possible for many persons to take advantage of this efficient, convenient and entirely automatic method of heating.

We have an adequate supply of gas and have established a house heating rate—a rate which our customers secure when they install gas heating and which then applies on gas consumption for all purposes.

A Nationally Known Product

We have made arrangements to handle the gas heating equipment manufactured by the [redacted] and known as the [redacted] following our own operating tests which convince us that it is a thoroughly satisfactory piece of heating apparatus.

A number of our customers have already investigated House Heating with Gas with the result that we have contracted to furnish heating service this coming season to 16 homes and buildings as follows:

13 Residences
1 Apartment House
1 Office Building
1 Hotel

Position of The Company

The policy of the Stamford Gas and Electric Company, in common with almost all other Gas Companies, is to sell heating equipment through local heating contractors of established reputation, because we know that our job is to supply the fuel-gas—and see that the equipment, when installed, gives proper service to our customers.

We are not in the steamfitting business, nor do we consider this a proper field for a public utility

Heating Contractors Co-operation

Therefore, we have enlisted the support of the heating contractors whose names you will find listed below. These men and firms, with our co-operation, are prepared to sell and install gas-fired steam, hot water, vapor or warm air boilers at standard prices.

Heating Service Supervised by The Gas Company

You may purchase a gas boiler direct from us or through your own heating contractor who will make the installation. We will see that the equipment is correctly installed and will maintain it in satisfactory operating condition for you just as we do with ranges, water heaters or other gas appliances.

A Statement of Policy

We make this statement in the interest of a correct public understanding of the position of The Stamford Gas & Electric Company and of the heating contractors of the city.

From time to time we intend to publish other advertisements dealing with the question of house heating with gas in all its phases. Watch for these.

Write or Call for Descriptive Booklet

In the meantime we suggest you write or call on us for complete details and illustrated literature which fully explains why and how you can enjoy the new freedom offered by gas for home heating.

THE STAMFORD GAS and ELECTRIC CO.

Cooperating with the following Heating Contractors

Connors & Rohacik	50 Bell Street	George A. Powers	91 Lockwood Avenue
Frank J. Daley	893 Main Street	C. D. L. Raymond	680 Main Street
Max Eschkuff	60 Pacific Street	Robert W. Raymond	813 Main Street
Fuchs & Rutz	35 Atlantic Street	J. F. Richards	41 Gay Street
Edward A. Gotwood	203 Henry Street	Richards & Jessup	77 Summer Street
John F. McNamara & Co.	458 Atlantic Street	John H. Smith	35 Summer Street
Thomas F. Murray	128 Seaside Avenue	Smith Bros.	83 Park Row
Charles Nevay	10 High Street	Charles L. Thompson	891 Main Street
John J. O'Brien	43 Willow Street	The James Wilson Co.	43 Hoyt Street

HEAT YOUR HOUSE WITH GAS

and get your fuel by PIPELINE

One of a Series of Newspaper Advertisements Put Out by the Stamford (Conn.) Gas & Electric Company

stalled, the steam fitting trade has a chance, if they believe in house heating, to put in a gas boiler, where they have no such opportunity to replace a coal boiler until it is worn out, which may be many years. There is a large field for the steam fitting trade and the gas industry must point out this field to the steam fitter.

5. Gas Consumers: The fact that gas house heating has progressed so very slowly, even where advantageous gas rates have been put into effect, is an indication that we must teach the consumer directly, through all the forces at our command, just what he obtains when he pays his gas bill. This sales effort must consist of national advertising, local advertising, direct mail advertising and personal solicitation of the highest calibre. As we approach the ultimate consumer directly, we must be sure that our employees, the architect, the builder and the steam fitter are cooperating with us. Thousands of consumer prospects, attracted by advertising and personal solicitation, have been lost at a word from one of the four classes mentioned above. The question of operating costs is important in that the customer must be shown what he is purchasing when he pays his gas bill. Bare fuel costs should never be thought of by a gas company employee who is interested in selling gas for house heating. An estimate of $500 per year for heating a home should always include a list of the things the consumer purchases. It is estimated that the average cost for operating an automobile per year in this country is $700. If the average distance covered by an automobile in a year is taken as 7000 miles, the cost of operating an automobile is 10c a mile. If an automobile salesman, in selling an automobile, would call attention to this fact and further state that it is possible to ride on the train for 4c per mile, or to ride on a street car, in many cases, 20 miles for a nickle; and if the customer did not understand the advantages of privately owning an automobile, did not understand what he was paying for when he paid his average of $700 per year, how many automobiles could that salesman have sold when the industry was first starting in this country and how general would the use be at the present time? The points that sell an automobile are general comfort; ability to have one's own private conveyance, which is only a matter of comfort; speed of getting from one place to another; ability to entertain friends comfortably; the healthful influence of being in the open air; if well taken care of, the ability to go when and where the owner pleases at any time, and other like advantages. Those are the things that the automobile consumer, if he can be called that, pays for. In a like manner, gas house heating must be sold. It must be sold on the merits of the use of it with the resultant comfort and satisfaction. It will take time. It will take effort. Satisfied users will unconsciously sell their friends, just the same as automobile users have sold their friends. High gas bills will join the category of high automobile operating expenses. If the advantages are thoroughly understood by the customer, the high bill will disappear.

Methods of Surveying the Prospective Market for House Heating

In surveying a city for the purpose of estimating its potentialities for house heating with gas, John H. Hartog, of the Portland Gas & Coke Co., Portland, Ore., mentioned three principal factors as of basic importance, namely—climatic conditions, fuel supply and gas rate.

The gas rate does not necessarily have to be determined from the fuel supply and cost, for it might be that the rate necessary to charge for gas would be so low as to make the survey of ruling temperatures and fuel costs superfluous. Situations are thinkable where gas could not be profitably produced at a competitive figure.

Omitting such possibilities, the first thing to inquire into would be the ruling temperature, and this one would have to study somewhat more in detail than by simply accepting official temperature charts, which might be decidedly misleading.

It would be well therefore to study the valuable data given in Chapter III of the House Heating book of the American Gas Association.

The points to find out about are:

How cold does it get? How many hours does the cold last? How much humidity is in the atmosphere? Is there much snow, or none? Are there howling winds or slight disturbances? Is there rain and from which direction? The mean temperature has very little to do with all these and yet it is easier to heat a house with a layer of snow filling every crack and crevice at a low outside temperature, than to heat a similar house at a much higher outside degree but with a biting wind blowing through the walls.

Having ascertained from reliable data, and, if possible, from personal knowledge of the situation, just how much heat is to be supplied, the next question is competition—the competition of solid fuel.

What are people using to heat their homes? And what are the prevailing prices? Even though fuel is abundant and cheap, as wood is in this part of the world, that does not mean that gas cannot compete, as witness the fact that Portland, with a superabundance of wood on every hand, led out as the pioneer seven years ago in house heating. Fortunately, the furnaces in which wood is burned are so wasteful and the gas furnace so efficient, if properly constructed and scientifically installed, that the cheapness of wood was not as great an obstacle as otherwise might have been the case.

Having ascertained the climatic data, estimated the required heat units and secured the average solid fuel heating bills for specific houses, it is a simple problem in arithmetic to divide the one into the other and find what gas would have to be sold at to compete.

By competing, one should bear in mind that the total gas bill need not be the same in dollars and cents as the previous fuel bill. Not at all. It is very easy to prove by advertising and other modes of publicity how much more gas heating is worth than stoking. That, however, is a question of propaganda and selling, and therefore does not belong in this discussion.

Having ascertained the rate necessary to secure at least a share of the house heating business, the next step is to find out whether that rate can profitably be made and upon the degree to which this is possible will depend the amount of business that can reasonably be expected.

Finally, it is interesting and profitable to ascertain from the building permit office just how many houses were constructed during the previous year or years, dividing the total into groups, as say under $2000 from $2000 to $4000, from $4000 to $7500 and over $7500.

Different localities will differ as to conclusions, for some cities are conspicuously conservative, others notoriously extravagant. But taking an average type of American city, one might conclude that the houses under $2000 are not potential customers, that the next group would be prospects for a floor furnace with or without a radiant heater, and the average consumption calculated in the aggregate, that the next group would be good for a gas furnace plus one or more radiant heaters while the highest-priced group would come in for gas-fired boilers, hot water, steam or vapor besides several radiant heaters.

All of this makes an interesting table to ponder over. What percentage can be obtained? That depends on two things: The rate for gas and the enthusiasm back of the sales efforts.

It is not out of place to estimate the possible maximum of gas heating prospects in the middle-class and well-to-do homes at 100 per cent, considering that gas has such a tremendous margin over solid fuel that it is simply a question of how hard one wishes to push the efforts and how big a percentage of total house heating load the company is willing to assume.

Selling Insulation for Better Heating Economy

How important a place the insulation of buildings occupies in the gas house heating program was indicated by G. C. Carnahan and H. B. Johns, of the Peoples Gas Light and Coke Company, Chicago, Ill., in the section on "Selling Insulation for Better Heating Economy."

This section showed how the heat losses through building may be materially reduced by the proper application of good insulation material.

The Peoples Gas Light and Coke Company, it was brought out, in co-operation with several insulating companies, has insulated a number of attics in homes which have been heated with gas for a year or more. Savings of from 10% to 15% have been shown on two-story residences and from 20% to 30% on bungalows. In one example, 380,400 cu. ft. of gas were used for a heating season of 6,974 degree-days—in 1924-1925 season. In 1925-1926, a season of 8145 degree days, the consumption probably would have been in the neighborhood of 441,000 cu. ft. had the ceiling not been insulated. The actual consumption for the 1925-1926 season was 317,200 cu. ft., a saving of 123,800 cu. ft., or 28%.

Who Should Sell House Heating?

The importance of having gas house heating sales in the hands of the gas company was expressed by C. O. Frary, of the Bryant Heater and Manufacturing Company. The gas companies, he said, are unquestionably the logical distributor, as they are in a position to render 100% service, which is absolutely essential. Gas heating is a quality article and quality service must be rendered, if it is to be properly sold, so that the final result is 100% heating service.

The larger gas companies should have a special House Heating Department with quality salesmen and quality service men.

The smaller gas companies should at least have a quality salesman specializing on house heating sales.

The problem is to get quality salesmen. What type of salesman is best fitted? What must he know? How can be obtain the required training?

The ideal gas house heating salesman is a man with technical training, with experience in both the heating business and the gas business and with the general qualifications for salesmen. This specification is hard to fill and generally the man selected falls short.

The first essential in successful selling of gas house heating is the natural ability to sell, that is, selling personality. A man may have all the other qualifications for this position and still be a positive failure on account of his inability to sell; therefore, every applicant should be made to prove his worth as a salesman before much time is wasted teaching him the gas house heating business.

A technical college graduate is suggested as the ideal man for several reasons. He has the necessary training so that he can talk in an intelligent manner to consulting engineers, architects and heating contractors in their own language. He has learned how to study so that he can obtain the necessary knowledge of the heating and gas business. His living standards are above the average so that he is not apt to stammer over the mention of a thousand dollars or two when selling well-to-do customers.

Most gas companies have excellent material from which to make house heating salesmen within their own organization.

When a salesman has been selected he should be given training in the distribution department so that he will know what gas is and how to light it. He should then be given a course as salesman in the Commercial Department.

The knowledge that a house heating salesman should have can be obtained in several ways. Most gas companies that are already in the house heating business are ready and willing to give visiting gas men their experiences, so that much valuable information can be obtained through an inspection trip among a few gas companies. The equipment manufacturers' representatives will help the salesman acquire much of the technical knowledge which is essential for him to have. Many of the Engineering Schools are giving short courses on heating where much valuable information can be obtained. Many very fine papers have been written on the subject of house heating that are available.

After a gas company has a Heating Department established it is a comparatively easy matter to train new men as they are required. A very good method is to start future salesmen as service men, as in service work they obtain a thorough knowledge of the equipment they are to sell, which knowledge is very important; they get a good experience with gas; and have an opportunity to meet the consumer and learn his viewpoint on gas heating and his objections, if he has any. This will help materially as he will naturally study his subject and learn what arguments to advance to offset the objections raised.

When a satisfactory gas house heating salesman has been developed, every possible inducement should be offered to hold him as he is a rare article and it is very expensive to train new men. By all means, when a gas company has a good gas heating salesman they should pay him well rather than lose his services. Many companies have lost good men simply on account of their salary scale.

The steamfitters, architects and consulting engineers are very valuable assets to gas companies selling gas house heating. Every effort should be made to get and hold their good-will. Properly handled, these sources produce a nice plum of business with a minimum of effort.

Gas house heating is only in its infancy and great care should be taken not to oversell any prospect by use of high pressure salesmanship or exaggeration of heating costs. Every satisfied customer is a wonderful asset but one dissatisfied user, made so by poor salesmanship, will do an inestimable amount of harm.

These points on who should sell house heating are merely a summary of the experience of gas companies that have been successful in gas house heating and should be taken for what they are worth.

Exhibitors of Gas Heating Equipment

Among the exhibitors, many of whom will be recognized as manufacturers well-known in the heating field, are the following:

Abendroth Brothers, Port Chester, N. Y.
A. G. A. Laboratory Exhibit.
American Gas Association, New York.
American Gas Products Corp., New York.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Automatic Gas Steam Radiator Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, Ohio.
Bartlett Hayward Co., Baltimore, Md.
The Bristol Co., Waterbury, Conn.
Bryant Heater & Mfg. Co., Cleveland, Ohio.
A. M. Byers Co., Pittsburgh, Pa.
Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.
Cleveland Heater Co., Cleveland, Ohio.
James B. Clow & Sons, Chicago, Ill.
Columbus Heating & Ventilating Co., Columbus, Ohio.
Combustion Utilities Corp., New York.
Grinnell Co., Providence, R. I.
Hays Manufacturing Co., Erie, Pa.
Honeywell Heating Specialties Co., Wabash, Ind.
Johns-Manville, Inc., New York.
Linde Air Products Co., New York.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Mueller Co., Decatur, Ill.
L. J. Mueller Furnace Co., Milwaukee, Wis.
National Tube Co., Pittsburgh, Pa.
The Scientific Heater Co., Cleveland, Ohio.
B. F. Sturtevant Co., Boston, Mass.
Universal Gypsum & Lime Co., Chicago, Ill.
Walker & Pratt Mfg. Co., Boston, Mass.

Contractors' Trade Catalogs

A sign of the times is the increasing disposition among heating contractors to issue trade booklets describing and illustrating the various installations for which they are responsible. Along this line, we are in receipt of two pamphlets issued by Buerkel & Co., Inc., of 18-24 Union Park St., Boston, Mass. The first of these pamphlets is entitled "Heating and Ventilation of the Samuel Appleton Building" and the second, "Scientific Heating, Ventilation and Power."

A third booklet issued by the Fisher Heating Company, of Memphis, Tenn., shows illustrations of typical work executed by the company, followed by a list of some of its principal installations.

THE SCIENTIFIC SUCCESSOR TO COAL is an interesting booklet published by Winslow Boiler & Engineering Co., Chicago, descriptive of the new type "H" Kleen-Heet oil burner. The booklet is interesting, chiefly because of the simplicity with which the subject has been handled and the absence of exaggeration in statement. Size, 5½ x 8½ in. Pp. 12.

Smoke Abatement School in St. Louis

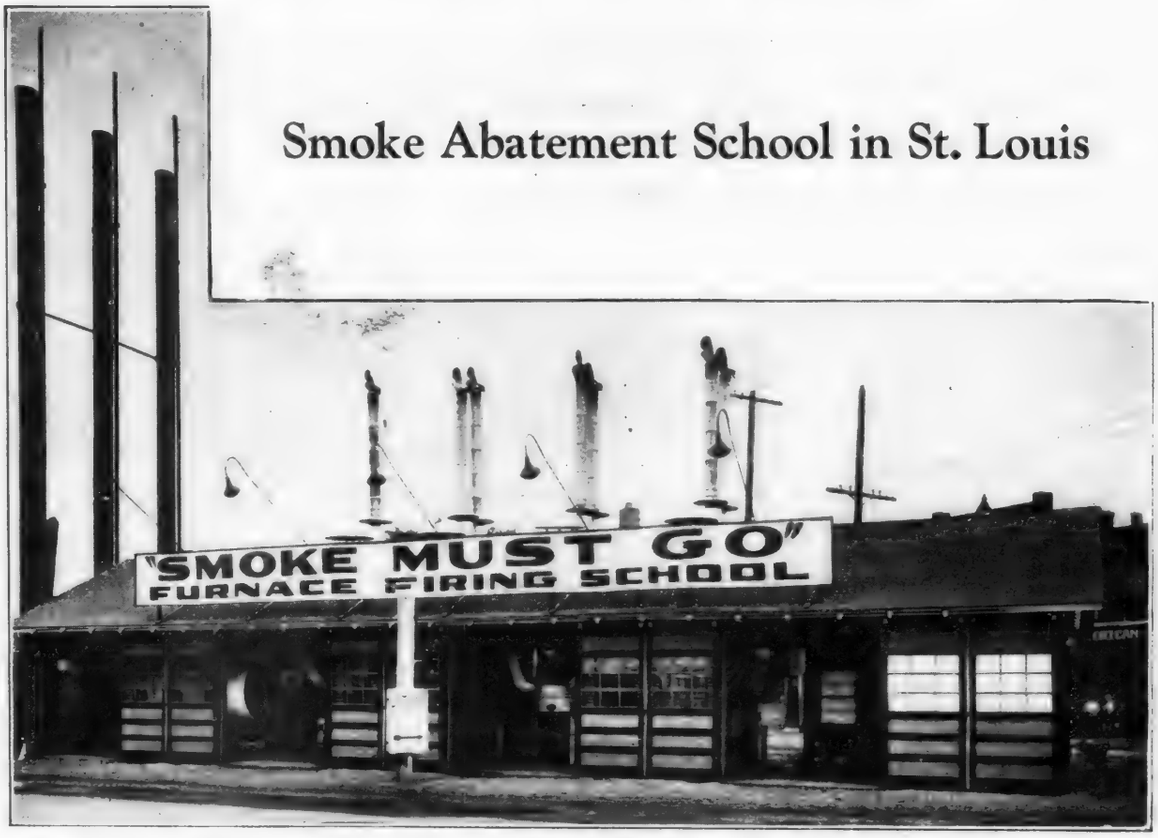


Fig. 1. Furnace Firing School, St. Louis

EXPERIMENTS begun a year ago for the Donk Brothers Coal and Coke Company of St. Louis, by Professor F. A. Berger of Washington University, indicated that great improvements could be made in the methods of burning coal and other fuels in households, apartments and other similar heating plants. After conducting these experiments in a more or less limited manner, an expert furnace engineer, Charles J. Buder, was employed as Director of Research and Combustion Engineer, to take charge of this department.

Under Mr. Buder's direction and with the co-operation of Victor J. Azbe, combustion engineer and chairman of the Technical Division of the Citizens Smoke Abatement League, Director of Public Safety J. H. Brod, Smoke Commissioner R. R. Gordon, William G. Christy, executive secretary of the Citizens Smoke Abatement League, the Warren Coke Company and various furnace and boiler manufacturers, the Furnace Firing School was established.

This school operates under the slogan "Smoke Must Go" as is shown in the exterior photograph (Fig. 1) and has for its object, better and cleaner heating with less fuel and labor and a great reduction in smoke for the residential section of St. Louis. Another object is to acquaint the buying public with the fact that there is plenty of first-class non-smoking apparatus in the market to satisfy every heating requirement and to interest the furnace and boiler manufacturers in building still better equipment by producing a public demand for high grade equipment.

Installed in the school for demonstration purposes is a U. S. Radiator Corporation smokeless boiler suitable for a 30-apartment building, an American Radiator Company "Ideal" smokeless boiler, suitable for a 16-apartment building, a Kewanee Boiler Company down-draft smokeless boiler, suitable for a 30-apartment building, a Langenberg Manufacturing Company "Front Rank" warm-air furnace, an American Furnace Company boiler-plate furnace and a Buck Stove and Range Company "Stack Test" furnace. There is also a space provided for tests on experimental furnaces and at the present time, a warm-air, down-draft furnace invented by C. W. Swingley, vice-president and general manager of the Union Fuel Company, is being tried out and promises to develop into a very efficient device with the smokeless and down-draft features incorporated in it.

A general view of the classroom is shown in Fig. 2 and indicates how the furnaces are set for demonstration pur-

Fig. 2. Classroom and Furnace Installation in Furnace Firing School

poses. The furnace with the hot air elbows uncovered is an old type and is used to serve as a shining example of how a job should *not* be done. On the front of this furnace is fastened a large placard (Fig. 3) listing twenty odd things that are wrong about it.

In the section next to the furnace portion are placed the steam boilers, as shown in Fig. 4.

Instructions in furnace firing are given daily from 8 to 10 P.M. and visitors are always welcome. Lantern-slide lectures are given at the request of any organization interested. It is stated that the attendance and interest in this school indicate a public appreciation of this kind of service.

Oil Burners Were Contagious

While a satisfied purchaser of an oil burner is frequently a means of selling other burners of the same make, it remains for a midwestern city to bring forth evidence of one case where the use of one well-known burner spread through a family like measles. An official of an industrial company purchased one for his home. He then bought four others for as many apartment buildings. Later, as chairman of the building committee of his church, he was instrumental in having one installed in the house of worship and later, one in the rectory. Two married sons then purchased duplicate burners and before the season was over, a son-in-law, sisters and brothers completed a grand total of 15 burners.

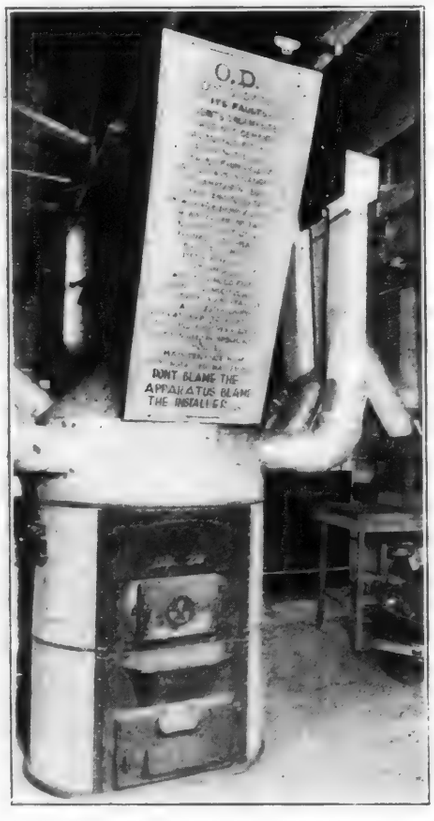


Fig. 3. Furnace with 20 Errors of Installation, Furnace Firing School

Fig. 4. Steam Smokeless Boiler Installation, Furnace Firing School

Oil Fuel Scare Discounted by Oil Producers

The report made early in September by the Federal Oil Conservation Board in which it was intimated that the visible oil supply would last but six years at the present rate of consumption brought forth vigorous protests from oil producers from all producing sections. The implication was not too carefully veiled that there was "an axe to grind," and that it might have to do with the Mexican situation.

A number of prominent oil men, in interviews for the *New York Herald-Tribune* were quoted as follows:

Percy L. Craig, president of the Freedom Oil Works Company, said: "Having been in the oil business more than thirty-five years, I know that it is about time to look for another false alarm about the shortage of petroleum. We still have pioneers in the oil industry, and they will tell you that the visible supply of oil is greater to-day than it ever was. There is an abundance of petroleum in the United States, so why become unduly concerned about foreign development?"

D. E. Weir, president of the Waverly Oil Works Company, said: "The Government Oil Commission's report to the effect that there is only six years' supply of petroleum in the country is about as foolish a prediction as any man could make under the known circumstances surrounding the production of petroleum.

"No man knows how great a supply of oil there is yet under United States soil. The Government does not know how much oil is still underground, neither does any other man or set of men.

"When I started in the oil business twenty-five years ago we were then told that only ten years' supply of oil was under the ground. In those days most of the oil was taken from western Pennsylvania. Now we get oil from West Virginia, Ohio, Louisiana, Texas, California, Kansas, Oklahoma and other sections. At the present time considerable drilling for petroleum is being done in Michigan. Hundreds of thousands of acres of land that may be oil-bearing soil have not yet been touched.

"I consider the report of the Federal Oil Commission pure 'bunk'," said E. H. Buckner, president of the Houston Oil Company. "Whenever the price is right there will be plenty of production, as is the case at present, when production is the largest in history."

Ernest Carroll, of the Texas Company, declared he would not make a guess as to when the supply of oil would be exhausted. "I have been in the oil business thirty years," he said, "and I have heard the same thing every year, while to-day we have more oil than ever before."

J. C. Harris, of the Magnolia Petroleum Company, said: "I put no faith in the report of the early exhaustion of the oil supply. New fields are constantly being discovered and I do not think we need worry about the oil supply giving out any time soon."

In this connection, the bulletin of the American Petroleum Institute dated August 18 contains some figures and thoughts that are entirely at variance with the report of the Federal Oil Conservation Board.

This report states that over 5,000,000 barrels of oil are recoverable from the existing producing wells and from areas not yet in production, but known to contain oil. But it points out that the present methods of operation are so crude that only about one-fifth of the oil in any area is taken out. On this thesis, the Institute states that 26,000,000 barrels "can be recovered by improved and known processes, such as flooding with water, gas pressure and mining." Adding to this the vast untouched sources, such as oil shale, the report states that there is at least available over 734,000,000 barrels. *At the present rate of consumption, this would supply the country for nearly* 1000 *years.* This estimate takes no account of the oil underlying a billion acres of, as yet, unexplored and unproven land, constituting a national petroleum reserve.

From the foregoing it would seem that the average home owner need not be alarmed as the result of this report of the Federal Board.

Electric House Heating in the Far West

IN an article on "Electric Heating in the Modern Home," appearing in *The Architect and Engineer*, H. E. Sandoval, of San Francisco, brings out some significant points in regard to the use of electricity in California. The very thought of using electricity for all of the heat, light and energy activities of the home naturally brings both a thrill and a shudder to the inhabitants of the United States north of the Mason and Dixon line and east of the Rocky Mountains. The thrill is caused by the thought of having a home free from furnaces or boilers, piping and radiators, that can be heated with absolutely no thought on the part of the occupants, in which the cooking and other household activities can be carried on in the cleanest possible way. The shudder comes from thought of the cost of operating such a luxurious equipment. However, this article by Mr. Sandoval furnishes food for serious thought.

In the first place, the range of heating load from the most southerly to the northern end of California's coast line varies only between 2000 and 5000 degree-days. The 2000 degree-day line follows almost exactly one-third of the coast line at the southern end of the State, while the 3000 degree-day curve parallels the coast for several hundred miles in its middle section, while the 4000 and 5000 degree-day curves come down to the coast line in the northern part of the State, where there is a comparatively thin population. In other words, the average heating load on the coastal section, where the larger and more important part of the population is located, might be said to average 2500 degree-days, which corresponds to the load of the coast of North Carolina on the eastern seaboard. Again, the heating load in San Francisco is almost exactly equal to that in Norfolk. With this picture of the heat load, the following extracts from Mr. Sandoval's article are of interest.

HOW THE ELECTRICALLY-EQUIPPED HOME HAS DEVELOPED

"For the past three decades a person was considered as having an electric home first, when he had his home wired for electric lights; second, when he installed lamp-socket appliances such as the electric iron, vacuum cleaners, washing machine, and similar equipment, and third, when he added the electric range.

"To-day, a person does not have an electric home unless all energy for lighting, heating, cooking and power purposes is received through the electric meter and one bill from the electric company covers everything.

"The equipment in a typical home in this section of California consists of 110-volt lamps and fixtures, 110-volt appliances, such as toasters, waffle irons, cleaners, and the like, an electric range, an electric water heater, large-capacity electric air heaters (1,000 to 6,000 watts), an electric ironer and an electric refrigerator.

"The wiring consists of a heavy 3-wire 110-220 volt main service, usually three No. 2 wires; 110-volt lighting circuits; 110-volt appliance outlet circuits; a 3-wire 110-220-volt range circuit; a 220-volt heater circuit, and a 220-volt circuit for each heater or heating device over 660-watt capacity.

"Before going further, it is well to state that the all-electric home is made possible by a favorable combination of two factors, namely, climatic conditions and low rates for electric energy. This article has to do primarily with climatic conditions as found in California, and a combination lighting and heating rate for electricity in that territory for an eight-room house, as follows:

First—30 K.W.H. per month at 7c.
Next—150 K.W.H. per month at 3½c.
All over 180 K.W.H. per month at 2c.

"A yearly minimum rate of approximately 50c per month per K.W. of connected load is in effect.

As an interesting comparison, the following figures are those in force in a Connecticut city, within 60 miles from New York:

First 200 K.W.H. per month at 2½c.
All over 200 K.W.H. per month at 2c.

The minimum charge is 60c per K.W. of connected load per month. Discount for prompt payment, 10%. (It will thus be seen that this eastern rate is even more favorable than the present rate in San Francisco.)

"In an average home of eight rooms or less," continues Mr. Sandoval, "30 K.W.H. ordinarily covers the lighting, 150 K.W.H. covers the cooking, and the heating is considered as being carried on a 2c rate.

"The most important thing regarding the all-electric home is the cost of operation, and it is interesting to know that there are many homes of from five to eight rooms using from $200 to $300 of electricity per year. This is put on a yearly basis rather than monthly on account of the heating. This amount is divided about as follows:

Electric lighting and appliances	$30 per yr.
Electric cooking	60 per yr.
Electric water-heating	60 per yr.
Electric heating	$50 to $150 per yr.

Making a total of $200 to $300 per yr.

"Compare this with the ordinary home, and for this purpose the following figures should be adjusted to local rates and prices:

Electric lighting and appliances	$30 per yr.
Gas cooking	25 per yr.
Gas water-heating	50 per yr.
Heating (coal and wood)	75 per yr.
Making a total of	$180 per yr.

ITEMS ENTERING INTO COST OF OPERATION OF A HOME

"Most people see only the fuel item which enters into the cost of operation of a home, whereas this is only one of several, and sometimes not the most important. The items contributing to the total cost are as follows:

1. Interest and taxes on first cost.
2. Maintenance.
3. Depreciation.
4. Labor necessary to operate.
5. Fuel or energy.
6. Health and safety.
7. General desirability.

"In new construction, the first cost of the all electric home and equipment is usually less than for other types, as chimneys, flues, ducts and pipe lines, can be largely eliminated, and excavations for basement, foundations and fuel storage are not necessary or can be kept to a minimum.

"At present most power companies maintain the equipment free of charge during the first year and thereafter charge for material only. The maintenance on electric equipment is generally less than for competitive equipment but the maintenance of ceiling, walls and furnishings must also be taken into consideration. Because of the absence of combustion in the Electric Home, it is mostly free from dirt, grease, and soot.

"Depreciation on electric equipment is very low, in fact, most of it will last as long as the home itself. In general the depreciation is low on the entire home as well as the equipment.

"There are four essential features to a good electric heater for room-heating in the home.

(1) The amount of radiant and convection heat should be balanced.
(2) It should contain as little mass as possible in accordance with good construction. The greater the mass, the greater the amount of heat stored in the heater that is not immediately available for heating the air.
(3) The heater should operate at a sufficiently low temperature so that the dust particles in the air will not be scorched and burned, thereby soiling the walls and ceiling.
(4) The heater should be so constructed as to require little maintenance and have long life.

"It is customary to install a heater in each room of such a size as to give a comfortable temperature on the coldest winter days. There are few extremely cold days, and it follows that for the average winter day the heater is larger than necessary.

HEATERS ALL EQUIPPED WITH THREE HEATS

"Heaters are all equipped with three heats so that they may be partially turned off to meet any condition. The larger heater also has the feature that, when a cold room is entered, the appliance may be turned on full heat for

a few minutes, which will rapidly raise the temperature, and after that it can be turned to a lower heat.

"With a difference in temperature between the outside and inside of a room, a definite heat transfer takes place from the walls, floor and ceiling, and it is necessary to supply that amount of heat to the room. With ordinary good construction in a house, 1½ to 2 watts per cubic foot will produce a temperature rise of 30° F."

Harold L. Alt Appointed Technical Editor of The Heating and Ventilating Magazine

Harold L. Alt, who recently returned to the United States after spending seven years in the Orient, with headquarters in Shanghai, China, as chief engineer of the Asia Engineering Corporation, and as an independent consulting engineer, has been appointed technical editor of THE HEATING AND VENTILATING MAGAZINE. He took up his new duties on October 15.

Harold L. Alt
In Uniform of Special French Police

Mr. Alt is well-known in American heating and ventilating engineering circles, having been associated for several years with Westinghouse, Church, Kerr & Company in New York, as supervisor of service equipment. Later, he became connected with the R. D. Kimball Company, New York, as chief of the sanitary division and assistant chief of the heating and ventilating division, as well as outside superintendent.

Although keeping in close touch with the progress of the art while in China, Mr. Alt returns to find the industry in a gratifying state of expansion and prosperity.

He brings to his new position a wealth of experience in both the American and foreign heating and ventilating field, which will be reflected in his work for THE HEATING AND VENTILATING MAGAZINE.

Closed Windows and Cooling Plants for Homes

That our future homes are to have closed windows and a cooling plant, is the opinion advanced by Professor Edward F. Miller, head of the Department of Mechanical Engineering at the Massachusetts Institute of Technology.

Professor Miller elaborates on this idea by going on to say that:

"The increasing demands upon human energy in this age of swift progress and keen competition call for new measures for physical comfort and protection. Extreme summer heat slows human activity and lowers efficiency in all branches of endeavor, whether it be in factory, office building or home.

"The household furnace has overcome the cold winter, but humanity still suffers for summer heat. It seems likely that within a few years cool rooms in which to work and live will be considered just as much a necessity as warm homes and buildings are in winter.

"It is not a serious problem now to produce air-conditioning and cooling plans for domestic purposes. These will consist of a refrigeration system in which air will be cooled and the moisture removed before it is put into circulation in the building.

"Air-conditioning and cooling equipment is best adapted for buildings of special construction, with ducts for distributing the cool air, and insulation to prevent leakage of heat from outdoors. Instead of opening all windows and doors, as is now done in summer, they will be closed."

Warm-Air Furnace in Service Three-Quarters of a Century

All age records seem to have been broken by the discovery of a No. 11 Richardson and Boynton brick-set warm-air furnace in Christ Church, Tarrytown, N. Y., which was installed and first began its heating duties in 1850. This was at the time Washington Irving was serving as senior warden of the church and the furnace was his gift of what was then considered a modern heating system.

From 1850 until this summer, the old furnace has been in continuous service each winter, but it is now considered desirable to replace the patriarch by a heating apparatus of somewhat more recent design. Still the old furnace is far from being out of commission. It would seem most fitting for the manufacturers to take over this relic at almost any price and preserve it for posterity, along with the Liberty Bell, the DeWitt Clinton Train and Old Ironsides.

Progress of Chicago Oil-Burner Campaign

THE completion of five billboards in the city of Chicago and the adoption of decalcomania signs embodying the organization seal of the Chicago Oil Burner Association, to be placed upon oil supply trucks, in display windows and at other points of advantage, were reported at the October meeting of the Chicago Oil Burner Association, held October 12, at the Allerton Club, Chicago. As explained by Chairman E. T. Fahey, of the Publicity Committee, who also presided at the luncheon, it is intended to carry the seal idea further, in the form of stickers to be placed upon letterheads, literature and contract forms.

TEXT OF PROPOSED OIL-BURNER ORDINANCE

A proposed ordinance regulating the construction and use of oil-burning equipment and storage and use of oil fuels used therewith, has been drawn up by the association.

Typical Bill-Board Used in Campaign of Chicago Oil-Burner Association

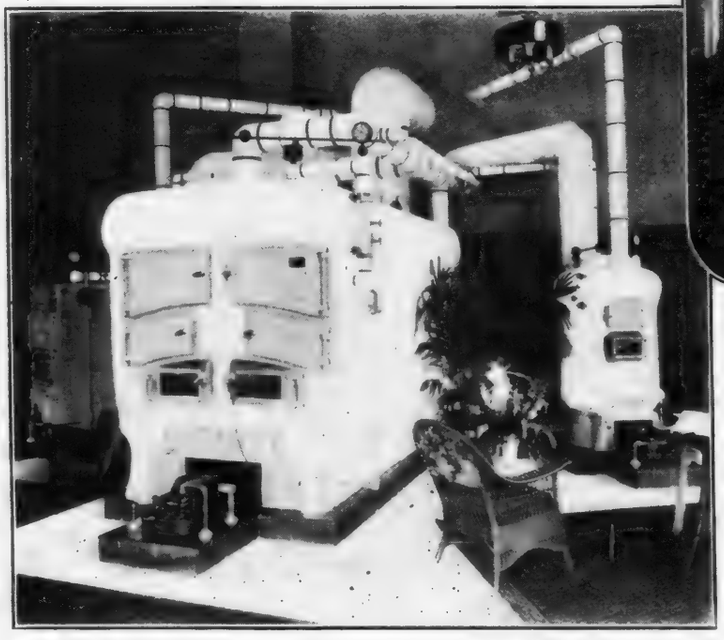
Aetna Oil Burner's
Showroom in Providence, R. I.

Oil-Burner Salesrooms Reflect Industry's Importance

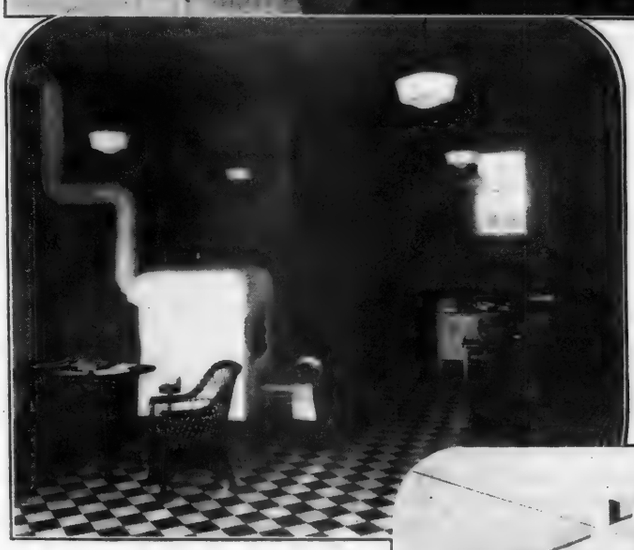
COMPARATIVELY few outside of the oil-burner industry appreciate the extent to which domestic oil burning has grown within the last two or three years, and the fact that to-day it is a vital element in the heating field. As a matter of fact, the gross value of oil-burner installations made during 1926 undoubtedly will almost equal the aggregate sales of all heating equipment, such as boilers, radiators and heating specialties. Sensing this probable development, THE HEATING AND VENTILATING MAGAZINE *has, from the beginning of this era, endeavored to present the true and unvarnished facts of the growth of the new child. The pictures on this and following pages of representative oil-burner showrooms tell the story with a vividness that words lack.*

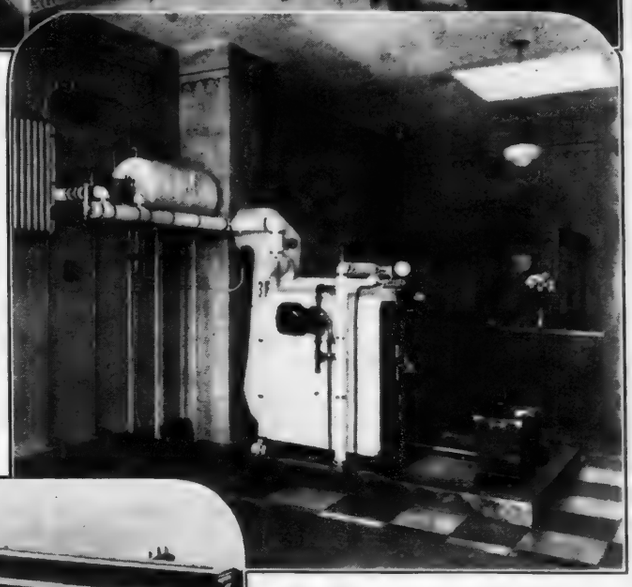
New York Showroom of Socony Oil Burner

Here are Typical Showrooms Designed to Express the Comfort and Cleanliness Secured with Oil Heat.



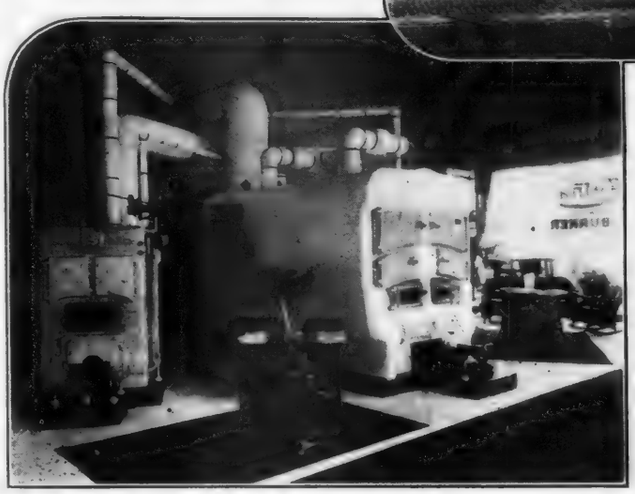
Such Displays are Found in Important Cities From Coast to Coast.





"Seeing is Believing" and Oil Burner Sales are Usually Based on Showing the Burner in Operation to the Prospective Customer.

Even the Most Elaborate of these Demonstration Installations is Entirely Justified in Any Home in Which Such a Burner Might be Installed.



American Society of Heating and Ventilating Engineers

Dates Selected for Annual Meeting

January 26, 27, 28, 1927, have been selected as the dates for the annual meeting of the society, to be held in St. Louis, Mo. Headquarters will be at Hotel Statler.

A committee headed by E. B. Langenberg, president of the St. Louis Chapter, has been appointed to handle the local arrangements.

Research Laboratory Holds Open House

An innovation in the shape of an "open house" at the research laboratory, on October 18, brought to Pittsburg a number of committee heads and others directly interested in the work of the laboratory, and materially supplemented the monthly meeting of the Pittsburg Chapter, held the same night.

Director Houghten, in planning the party, arranged to have practically all of the laboratory equipment in operation, the guests being conducted through the laboratory in small groups, so that each one had an excellent opportunity to get close enough to the problems to appreciate them.

The heat meter, designed for the determination of heat flow through various materials, was installed in the attic of the laboratory, the set-up being that for determining the flow of heat through a roof. There were three meter plates connected to a single potentiometer, one in each of the three slopes of the roof at that part of the building. By means of a system of selective switches it was possible to plot the flow into and out of each surface of the roof throughout the day and night. On exhibition were records made during the summer, showing graphically the rise and daily transit of the sun through its path.

The equipment used in determining infiltration through walls and around window and door openings was set up with a specimen of clap-board wall for test. There was no plaster on the lath, but the sheathing, weather paper and clap-boarding were applied in the conventional way. When a pressure corresponding to a 15 mile wind was applied to the face of the wall, the infiltration through 49 sq. ft. of the wall area was so great that, passing through a 2½ in. weir opening, it would extinguish a match two feet from the opening.

Miss Margaret Ingels, mechanical engineer at the laboratory, was in charge of the demonstration of the infiltration test, and of the A.-A. dust determinator, developed at the laboratory for measuring the quantity of dust in the atmosphere.

Probably the greatest interest was evinced in the test rooms where the classic experiments were made to determine atmospheric conditions of optimum comfort. The control apparatus was put through its paces, and demonstrated the ease with which almost any combination of temperature, humidity and air notion could be maintained. In this section of the laboratory was also shown the set-up for calibrating the heat meter plates.

PITTSBURGH CHAPTER MEETING

A bountiful buffet supper was served in the laboratory dining room, after which the visiting guests were joined in the assembly room by the members of the local chapter to the number of ninety. After the necessary chapter business, the meeting was turned over to H. P. Gant, chairman of the committee on research.

At the request of Mr. Gant, P. E. Fansler, secretary of public relations, outlined his activities and told of plans to couple the educational work of the society with the chapters to secure results of the greatest advantage.

Mr. Gant then outlined the many phases of the various problems confronting the committee on research, and pleaded for the heartiest co-operation from the individual members as productive of the quickest and most complete solutions.

F. C. Houghten, director of the laboratory, then gave a graphic sketch of his functions and aims. He emphasized the point that, as director, he did not determine the lines of research, but carried out to the best of his ability, the instructions of the various committees, each in its own line.

Successively introduced by Director Houghten, the out-of-town guests spoke briefly on the specific problems bringing them into contact with the laboratory. L. A. Harding, of Buffalo, C. V. Haynes of New York, Professor F. B. Rowley of the University of Minnesota, J. A. Donnelly, New York, S. R. Lewis, Chicago and R. V. Frost, Norristown, Pa., reminesced and were evidently believed by their listeners, but when W. G. Boales of Detroit attempted to show that the Michigan Chapter was without a peer, he faced an incredulous audience, and, judging from the compliments paid to the Pittsburgh Chapter by the visitors, lost his point. Other guests and speakers were: Professor A. J. Wood, Pennsylvania State College; A. E. Stacey, Jr., Newark, N. J.; E. W. Stitt, Pittsburgh; E. C. Lathrop, Chicago, and Percy Nichols, of the U. S. Bureau of Mines.

The meeting adjourned after a consensus of opinion that the "open house" had been a great success, and that it should be repeated as an annual affair.

Society Will Participate in Developing Code for Public Garages

At the request of the National Fire Protection Association, the A. S. H. & V. E. has been asked to designate a representative to serve on a committee, which has been formed for the purpose of drawing up comprehensive requirements for the construction and operation of public garages.

While the average city has requirements in ordinance form covering garages, they are, in many instances, obsolete. As a general rule, they have not been revised to keep pace with the great development which has occurred.

As an illustration, in numerous cities large garages, many stories in height, have been erected purely for parking purposes, as well as that of making repairs and conducting general garage operation. The development of the bus and the necessity for extensive buildings of very large areas is another problem which must be faced. The most difficult problem with which the fire protection and municipal authorities are confronted, however, is that having to do with sub-basement garages. In all of these cases, ventilation is a problem of pronounced importance. Heating, too, is a field that has not heretofore been properly covered. It is apparent, therefore, that the Society has an opportunity to render a very valuable service, not only to the interests mentioned, but to the public in general.

The work will be divided among a series of sub-committees on the following subjects:

Construction,
Areas,
Bus Garages,
Heating and Ventilating,
Hazards and Protection.

Owen M. Walther, 1502 Locust Street, Philadelphia, Pa., will represent the society.

The chairman of the committee is H. E. Newell, of the National Board of Fire Underwriters.

Other members of the committee include K. B. Brier, assistant superintendent of insurance, Philadelphia Rapid Transit Company; K. W. Adkins, engineer, Missouri Inspection Bureau, with headquarters in St. Louis, Mo.; J. F. Templin, assistant manager of the Western Actuarial Bureau, with headquarters at 209 West Jackson Blvd., Chicago; R. C. Loughead, chief engineer of the Michigan Inspection Bureau, with headquarters in Detroit, Mich.; E. P. Boone, manager, Automatic Sprinkler Department, New York Fire Insurance Rating, with headquarters in New York

City; William P. Yant, expert on ventilation, U. S. Bureau of Mines, Experimental Station, Pittsburgh, Pa.; W. K. Estep, Board of Fire Underwriters of Allegheny County, with headquarters in Pittsburgh, Pa.; J. Sanderson Trump, secretary, Philadelphia Fire Underwriters Association, headquarters in Philadelphia, Pa.; William B. White, superintendent, New York Board of Fire Underwriters, with headquarters in New York City; H. S. Smith, chief engineer, Prestolite Company, with headquarters in New York City; Louis Harding, manager, Underwriters Bureau of the Middle and Southern States, with headquarters in New York City; I. Osgood, assistant manager, Boston Board of Fire Underwriters, with headquarters in Boston; A. M. Schoen, chief engineer, Southwestern Underwriters Association, with headquarters in Atlanta, Ga.; Ray Nelson, Chicago Board of Fire Underwriters, with headquarters in Chicago; John Stillwell, representing the Society of Automotive Engineers, with headquarters in New York City; Frank Alcott, secretary of the N.S.P.A., Committee on Building Construction, with offices in New York City; A. H. Goodwin, assistant manager of the Firemen's Fund Insurance Company, with headquarters in Boston, Mass.; A. V. Knox, Chief Insurance Inspector of the Connecticut Company, with headquarters in New Haven, Conn.

The first meeting of the committee was held October 27, in Pittsburgh, Pa., at the Research Laboratory of the Society of Heating and Ventilating Engineers.

New York Past Presidents Honored at Chapter Meeting

Past presidents of the American Society of Heating and Ventilating Engineers in the New York district, who were not able to attend the presentation ceremonies at last summer's meeting of the society, in Lexington, Ky., were the guests of the New York Chapter, October 18, when they were presented with the society's emblem by President William H. Driscoll. All of the past presidents living in the Metropolitan area were in attendance, with the exception of C. B. J. Snyder. Those who sat at the guest table were: Reginald Pelham Bolton, D. D. Kimball, C. L. Riley, and W. S. Timmis, as well as President Driscoll and Dean Anderson.

Dean F. Paul Anderson, nominee for president next year, was also among the guests present and in a characteristic address, emphasized the value of traditions, in business, as well as in national life, and endorsed heartily the custom which has been adopted of presenting the retiring presidents with distinctive insignia.

In opening the meeting, President R. H. Carpenter called on E. J. Richie for an announcement regarding the November meeting, November 15. This will take the form of an inspection trip through the Hudson River vehicular tunnel. The party will meet at Pier No. 35 at 4 P.M. on that date on the New York side and, after inspecting the tunnel, will return to the Building Trades' Club for dinner. This will be followed by a talk accompanied by lantern slides, delivered by one of the tunnel engineers.

Mr. Carpenter then turned over the meeting to President Driscoll, who opened his remarks with the statement that he had appeared before every chapter of the society but one, during his term of office. He spoke at length of the society's past history. After turning over the first emblem to the chairman, with the remark that it would be presented at a later date to Mr. Snyder, Mr. Driscoll made presentations in turn to Messrs. Bolton, Kimball, Riley and Timmis.

Each of the past presidents, in acknowledging his gift, had some interesting things to say in connection with his term of office. Mr. Kimball divided the history of the society into four epochs, one having to do with the establishment of a society headquarters, the second being connected with the early agitation regarding ventilation, in which Dr. Luther H. Gulick figured so prominently, the third being connected with the organization of society chapters and the fourth, with the establishment of the Society's Research Laboratory. He expressed the opinion that we are about to enter a fifth epoch in connection with the present agitation regarding methods of ventilation.

Mr. Riley expressed his pleasure at receiving the emblem, declaring that it constituted an admission card to engineering circles in any part of the world. Mr. Timmis spoke particularly of the intimate association which had been afforded to him through his membership in the society and he felt that this was one of the outstanding characteristics of the society's activities.

Dean Anderson, who was called upon last, had an opportunity to benefit from the previous speakers' remarks. In commenting upon the close relations which had existed, especially during the war period, between President Driscoll and Mr. Timmis, he brought down the house by stating that, when Mr. Timmis received his emblem, he did not open the package. "He felt that he did not need to," declared Dean Anderson. "He knew it was there."

Ontario Chapter's Meeting Program

A full program for the season of 1926-27, has been arranged by the Ontario Chapter, through a committee headed by H. R. Flett, chairman, and including S. M. Peterkin, H. H. Angus and W. G. Sheppard. Following are the subjects and speakers for the meetings still to come:

November: Forced Hot Water Heating, by H. H. Angus, M.E.

December: Insulating Buildings, by E. B. Sheffield, B.S.

January: Research Work, by Prof. S. E. Dibble.

February: Report of Standing Committees, by H. H. Angus, M.E., Chairman.

March: Ventilation and Mechanical Equipment, by Dean F. Paul Anderson.

April: Heating and Ventilating Toronto Schools, by J. S. Patterson.

May: Warm Air Heating, by R. J. Miller.

June: Society Business.

Minnesota Chapter Guests of Minneapolis Heat Regulator Company

In accordance with an innovation which has been adopted successfully in the conduct of chapter meetings, the Minnesota Chapter was the guest, at its opening meeting, October 11, of the Minneapolis Heat Regulator Company, Minneapolis, Minn. The members assembled in the afternoon and reached the plant in time to see the various departments in operation, including the clock and thermostatic departments. After the inspection, a supper was served, followed by a short talk by C. B. Sweatt, treasurer of the company. Following his talk, demonstrations were given in the company's laboratory of new developments in heat regulators and the party was then conducted through some of the manufacturing departments which are operated in the evening.

The chapter committee chairmen for this year are as follows:

Meetings Committee, S. A. Challman; Membership Committee, A. M. Wagner; Legislative Committee, J. V. Martenis; Nominating Committee, C. E. Hasey; Auditing Committee, A. H. Probst, and Publications Committee, F. B. Rowley.

New Officers for Illinois Chapter

Officers, all of whom were re-elected at the opening meeting of the Illinois Chapter, held at the Hotel Sherman, Chicago, October 11, are as follows:

President, A. B. Martin; vice-president, E. P. Heckel; treasurer, August Kehm; secretary, H. G. Thomas. Board of Governors: J. A. Cutler, S. R. Lewis and J. D. Small. Sixty-three members and guests were in attendance.

In connection with the raising of funds for the victims of the Florida disaster, J. A. Cutler reported that 95% of the apportionment of the plumbing, heating and ventilating division was raised from the heating and ventilating branch and 5% from the plumbing branch.

Homer Linn presented an interesting summary of the society's summer meeting in Lexington, Ky.

The open-window ventilation agitation was brought before the meeting through the distribution of a reprint of

a paper by Samuel R. Lewis, entitled "Half Knowledge is Dangerous in Ventilation." Written comments on this paper, which appeared in a recent issue of *Domestic Engineering*, indicated the extent to which health officials have been "sold" on the open-window methods. In the discussion, G. H. Blanding stated that it was highly improbable a new school in Evanston, Ill., will have open-window ventilation. The school board, he said, has already instructed the architect to withhold specifications for mechanical heating and ventilating equipment and several of the board members are known to be partial to the so-called Watts system of ventilation.

In connection with a report of the chapter's recent golf tournament, held at the Wilmette Club, October 7, a number of still pictures and motion pictures of members and guests in action on the links were projected upon the screen and aroused much merriment. The pictures were presented through the courtesy of L. B. Spafford, of *Domestic Engineering*. The presentation of prizes won in this tournament was made by J. H. O'Brien, chairman of the chapter's golf committee.

Announcement by President Martin of the death of Foster W. Lamb was followed by the appointment of a committee consisting of Messrs. August Kehm and George Mehring to draft and forward to Mr. Lamb's family a letter of condolence. The members stood in silence, for a moment, in tribute to the accomplishments of Mr. Lamb in the industry and out of respect for his memory.

Reporting for the chapter publication, "The Illinois Chapter," C. W. Presdee stated that it had been temporarily suspended with the May issue and that the publication committee was awaiting instructions from the chapter. He also reported that the office of editor-in-chief was vacant, due to the removal from Chicago of J. E. Bolling.

Nine members were elected to membership in the chapter, including W. A. Burns, Charles C. Crone, Jr., Elmer H. Funck, Clarence C. Graves, Lawrence P. Lang, J. H. McCauley, J. W. Mathis, Cliff W. Presdee, and E. W. Rietz.

Western New York Chapter Hears Talk on Certified Heating

R. J. Mayer, a member of the firm of Mayer and Valentine, consulting heating engineers, of Cleveland, O., was the principal speaker at the opening meeting of the Western New York Chapter, held October 4, at the Hotel Buffalo. Mr. Mayer's subject was "Certified Heating." This he described as a national movement for better heating installations. He explained how it was based on radiation, boiler and other standards developed by heating engineers of national reputation. Certified heating, he stated, has been in operation in Chicago, St. Louis, Brooklyn, and other cities for some years and has been functioning in Cleveland for about a year. He pointed out the advantages of certified heating to all parties concerned, including the owner, architect, contractor and engineer.

In addition to the large number of members present, the guests included members of the Heating and Piping Contractors National Association and the American Institute of Architects. Nearly 90 members and guests were present for the dinner, and about 20 more came in for the meeting, which was conducted by President Farnham.

Pittsburgh Chapter Discusses Venting of Radiators

Martin A. Rooney, engineer for the American Radiator Company, was the principal speaker at the opening meeting for the season of the Pittsburgh Chapter, held September 13. Mr. Rooney discussed at length the recent tests that have been conducted, both at the Research Laboratory and elsewhere, bearing on the venting of radiators. Director F. C. Houghten, of the A.S.H. & V.E. Research Laboratory also spoke. Vice-president T. M. Dugan was in the chair.

Michigan Chapter Hears Talk on Fuel

T. F. Hirshfeld, chief of the Research Department of the Detroit Edison Company, Detroit, Mich., was the principal speaker at the opening meeting of the Michigan Chapter, held October 11. Mr. Hirshfeld's address was devoted to fuels in their various forms. He emphasized the progress being made by the gas companies throughout the country in the way of using gas as a heating fuel in all types of buildings. The meeting was in charge of J. H. Walker, chairman of the Program Committee. Following Mr. Hirshfeld's address, there was an entertainment in the form of music and motion pictures, concluding with a raffle. There were 38 members and guests present.

President Macintire submitted a proposed constitution and by-laws, which was adopted, subject to the approval of the council of the society.

Committee Formed to Further Certified Heating

At a meeting of the board of directors of the Heating and Piping Contractors National Association, held in New York, September 20-21, 1926, a committee was appointed to study the application of certified heating and to work out a standard program for instituting and operating this service throughout the country.

This committee consists of Herbert A. Snow of Boston, chairman; William D. Emery, of New York; E. M. Harrigan, of Detroit; Louis T. Braun, of Chicago; A. R. Herske, of Cleveland, and Thomas Gale, of St. Louis.

National District Heating Association to Meet Again in West Baden, Ind.

Announcement is made that the 1927 convention of the National District Heating Association will be held in West Baden, Ind., May 10-13, 1927. Headquarters will be at the West Baden Hotel.

National Association of Fan Manufacturers Plans Compulsory Ventilation Campaign

Important steps to make proper ventilation compulsory in schools, public and industrial buildings were taken at a recent meeting of the National Association of Fan Manufacturers, held in Detroit, October 12.

The president of the association, E. B. Freeman, of Boston, declaring that the 200,000 Detroit school children were the healthiest in the world, because Detroit schools have the best system of ventilation, called for more rigid enforcement of compulsory ventilation. Mr. Freeman declared that statistics show tuberculosis, bronchitis and respiratory diseases were on the decline among the school children because they are being given clean air at the right temperature and humidity during school hours.

A great tribute was also paid to John R. McColl, Detroit engineer, who, as Mr. Freeman stated, is largely responsible for the ventilation system used in the Detroit schools.

A committee composed of three members, J. F. G. Miller, of Detroit, vice-president of the American Blower Company; J. M. Frank, of Chicago, and C. A. Booth, of Buffalo, was appointed to urge the more rigid enforcement of laws in all American cities to bring about efficient air conditioning of school, public and industrial buildings.

A committee was also named to confer with Secretary of Commerce Herbert Hoover, government architects and others, in regard to plans to remodel the Senate chamber and other antiquated Federal buildings.

Work Started on Second National Heating and Ventilating Exposition

With the initial meeting of the Advisory Committee at the Hotel McAlpin, New York, October 19, work was begun in earnest on the Second National Heating and Ventilating Exposition, which will be held March 14-19, 1927, in the Twelfth Regiment Armory, Columbus Avenue, 61st to 62nd Streets, New York.

The new chairman of the Advisory Committee is R. V. Howes, of the Consolidated Gas Company, who takes the place of W. E. Craven, president of the Pyramid Iron Products Company, who has resigned, due to his connection with another line of business.

It is stated that over 95% of last year's exhibitors have reserved space, some of them taking double and a few three times the space occupied in the previous exposition. Definite plans were laid at the Advisory Committee's meeting for acquainting the entire industry with the possibilities of such a show, as demonstrated at the first exposition.

In many respects, the Twelfth Regiment Armory has been found to provide more suitable quarters for an exposition of this kind than the previous quarters. Although not so large as the Madison Square Garden Exposition Hall, the Twelfth Regiment Armory, nevertheless, has ample space for accommodating a comprehensive heating and a ventilating show.

Space reservations are being taken by the National Exposition Co., Inc., Suite 334, Hotel McAlpin, New York.

Snow-Covered Homes as Evidence of Insulated Roofs

An interesting prophecy of the winter appearance of future American homes was made by Samuel R. Lewis recently, when he stated that their livable qualities would be known from the amount of snow they had on their roofs. Mr. Lewis is the originator of the phrase, "the snow-covered roof" of which undoubtedly, much will be heard during coming years.

Safety Code for Building Construction

After numerous delays, caused by important differences of opinion within the Sectional Committee on the proposed national safety code for construction work, upon which the American Engineering Standards Committee has been at work, under the official leadership of the National Safety Council, it is announced that the Sectional Committee has now agreed upon certain changes in objective and in administrative arrangements, to which it is hoped to complete its first report at an early date.

Correspondence

Conducted by T. W. Reynolds

Frost Formation on Show Windows

EDITOR HEATING AND VENTILATING MAGAZINE:

Being a subscriber to THE HEATING AND VENTILATING MAGAZINE, we take the liberty to ask you your impressions as to the cause of frosting on the inside of show windows and the method of preventing this condition. For your information, we operate and maintain approximately 300 stores throughout the country and are continually designing and building new ones to add to the chain.

Some of our managers complain quite often that frost forms on the show windows to such an extent that it is impossible to see the display. Of course, we are familiar with the immediate cause, which is moisture in the room condensing in contact with the cold glass surface whenever the temperature is such as to cause freezing.

The windows are constructed with a window back, so as to be air tight, that is, the entire show window itself is made as near tight as possible, having the ceiling and floor with bulkhead underneath and above. The glass setting bars are of the air-tight variety. Experiments were made with both types, the ventilated bar and the air tight, and more complaints were received regarding the ventilated bar than the air tight type, due to the fact that soot comes in the opening and injures the merchandise. Our managers would much rather have the windows frost up than to have the accumulation of soot. All steam pipes are kept from the close vicinity of the windows and from underneath the bulkhead.

A peculiar thing is that though a window will frost up in one store, an identical window in another store sometimes will not frost up. Then again, where we have an adjacent store the windows sometimes frost up and again they do not, though such stores seldom have window backs, thus being open to the moisture of the room at all times. This is a peculiar condition.

We would appreciate an expression from you as to your experience with

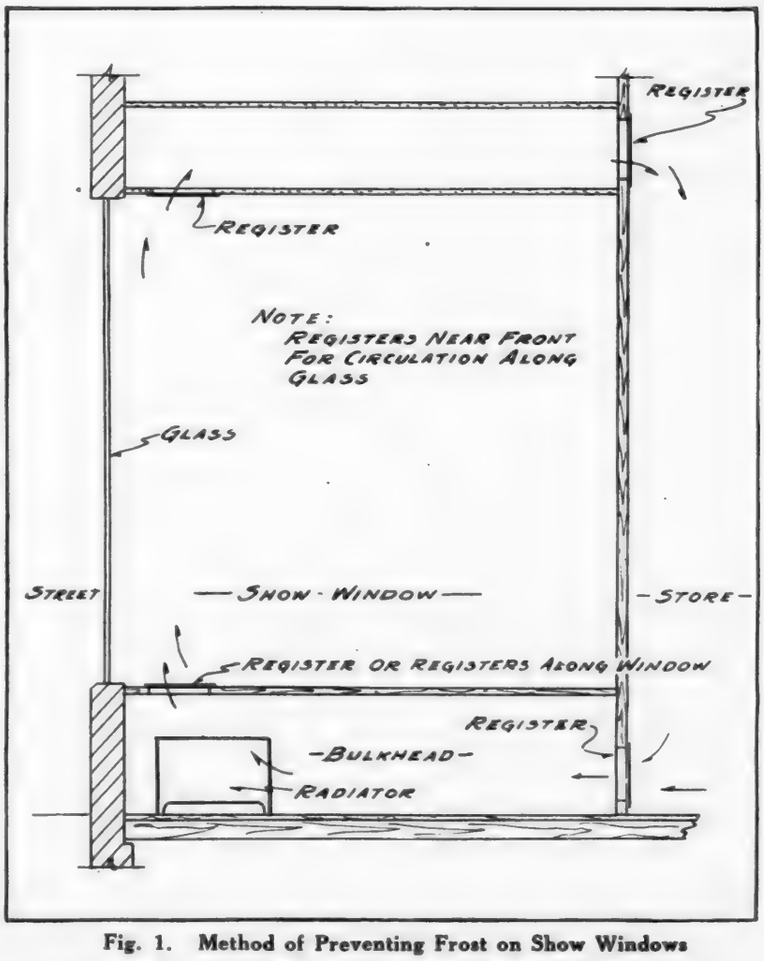


Fig. 1. Method of Preventing Frost on Show Windows

this condition. We consider our experiences valuable, but as yet have not entirely solved the problem. When the stores grow older the windows do not fit so tightly and the doors sag and cannot be properly refitted to keep air out of the store.

Detroit, Mich. S. S. KRESGE CO.
Harold Holmes, Architect.

It was found many years ago that small electric fans of the desk type blowing against the inner window surface will remove or prevent frost. This action is due to bringing warm, dry air from the store interior against the glass surface so that any frost thereon is evaporated and its further formation prevented because the temperature of the glass is raised to a point above the frost-formation point of the air. This is a simple way of keeping the windows clear and is much safer and superior in every way to a row of gas jets, as sometimes used along the window-front at the bottom. In cases where the frost formation is most severe the best method is to heat and circulate the air within the window as shown in the sketch, using either a radiator of the window type, or an indirect radiator, say one of copper, as this occupies a minimum of space. If desired, a fan could also be used.

One window may frost and another not, according to the moisture present from various causes, such as steam escaping from pipes, air valves, loosely-fitted pet cocks and valve stems, or from moisture of bodies and breath, and, most of all, according to the nature of the display. Moisture, for instance, forms a large constituent of fruits and vegetables.

If the window is kept tight and the enclosure is not heated, the large area of glass, being the best transmitter of heat in the room, will eventually lower the temperature of the air to its saturation point, at which moisture will be deposited and then frozen on the glass. It is not the outside air that causes the difficulty so much as the inside air which has taken up moisture.

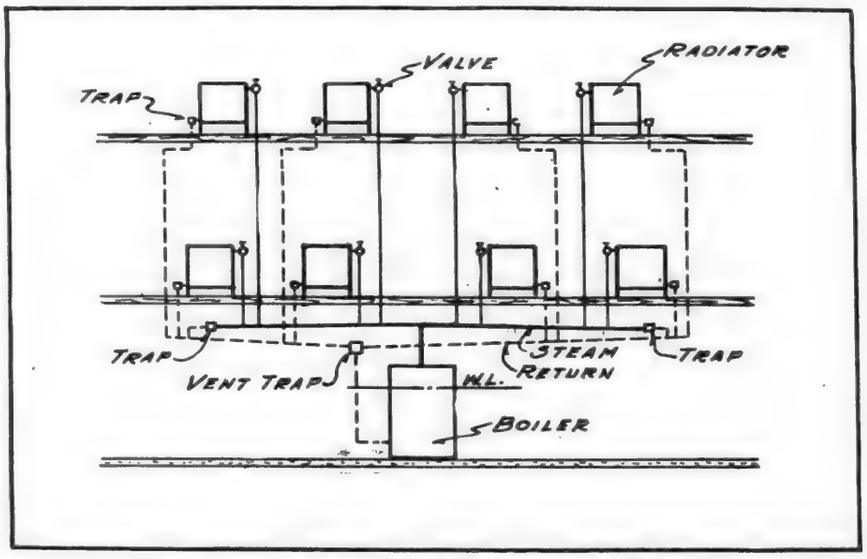


Fig. 1. Ordinary Method of Running the Return

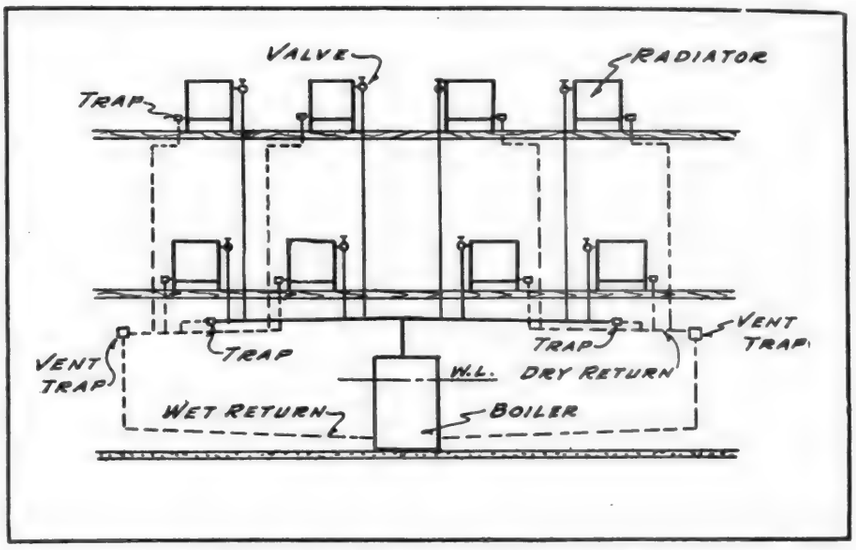


Fig. 2. Method of Piping for a Reversed Return

An air-tight window, confining air which is neither circulated nor heated, would give more trouble than the next store in which the heated air is allowed to circulate and raise the temperature of the glass due to absence of a window back. This fact, together with the relative degree of tightness of the various store windows and nature of the display should explain why one window frosts up and another does not.

Why The Reversed Return Is Better

EDITOR HEATING AND VENTILATING MAGAZINE:

I am submitting two sketches showing details of two vapor heating systems. Fig. 1 shows steam and return mains pitching in opposite directions with last radiator supplied being last connected to the boiler. Fig. 2 shows a balanced or reversed system.

A discussion arose regarding which method is the best to use. I maintained that the balanced system should be used, because the radiators would be equally warm, whereas in the case of Fig. 2 the last radiator would be cooler than the first radiators. I would like an answer telling which system is the best to use, and your reasons why.

Detroit, Mich. ARNOLD OLSON
Engineering Dept., S. S. Kresge Co.

The reversed return as shown in Figs. 2 and 3 is generally preferred. It is the one more likely to get results, especially in water heating work where it has been widely used. In water heating systems the motive head for circulation is slight, even at the best, so that it is a wise precaution to place each radiator on an equal circulation basis by making the total run from boiler to radiator and back again the same for each radiator.

In gravity steam heating the use of a reversed return is also desirable, as the steam flows direct and the pressure extends (without any interruption, such as a trap) through the return, as well as through the supply main, causing a considerable pressure-drop in both supply and return main, due to condensation and frictional resistance of the run. As a consequence, the pressure differential to cause flow through a radiator will be least at the farthest radiator, hence that radiator may be somewhat cooler or not heat up at all.

The reversed return is not so essential (though often used) in closed vapor systems as the conditions in such systems are slightly different. The pressure differential is not as great as in a gravity steam system and this differential will be more nearly the same in any part of the system. In a well-proportioned system, with return of sufficient size and properly graded, the pressure drop in the return during initial heating should never exceed 1/20 lb. per square inch differential between the farthest radiator trap and the vent trap, and during normal heating should be so slight as to be almost negligible. In other words, the pressure in the return

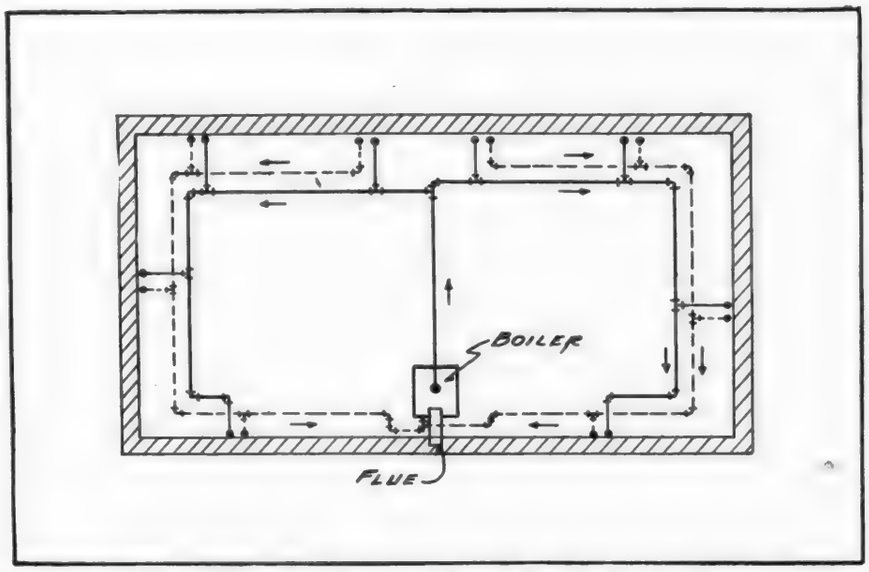


Fig. 3. Where the Reversed Return May Be Easily Obtained

main is more nearly a constant throughout the length of the return and this, together with the more positive and quicker removal of air from the system, makes the matter of radiator distance from the boiler of less importance.

In starting up a vapor system but little pressure is required, as the air does not have to be compressed for driving through the pin holes of radiator air valves, as in the ordinary gravity steam system. The traps are wide open and the pressure of the supply is then exerted through the large trap openings directly on the return, to expel the air quickly from the system. The steam itself is prevented from entering the return through closure of the traps by the time steam reaches these points and any steam that may be passed into the return by trap leakage is usually condensed in the return.

Sometimes the reversed return is not readily obtainable as the location of the boiler with respect to the building may not lend itself in a practical way to such an arrangement. If the boiler is located in the middle of one long side of the building the supply main may divide conveniently as shown in Fig. 3, but if the boiler is located at one end of this building, as shown in Fig. 4, the selection of a reversed return would cause a rather long run of supply and return pipe in sizes somewhat larger.

Domestic Gas Heating Rapidly Gains Ground in Kansas City

A statement has been published to the effect that the Kansas City Gas Company, in its campaign for a house-heating load, so far this season, has installed 858 units in Greater Kansas City and that over 2000 surveys have been made for additional prospective users. Over 400 installations were put in last year and with the approval of the Missouri Public Service Commission. The company is planning to add 2000 house heating customers on the trial 3-part rate in Kansas City, Mo. The Kansas public service commission has granted permission to the company to add 1500 trial customers on this rate in Kansas City, Kans., Topeka and Wichita. A representative of the gas company states that the company expects to have a large surplus of gas available in excess of the maximum demand that can be placed upon the company by this newly-created business.

Annual Meeting of the American Public Health Association

THE fifty-fifth annual meeting of the American Public Health Association, held at the Hotel Statler, Buffalo, October 11-14, drew members from both coasts and from the limiting latitudes of American health activities. So comprehensive was the program that it, and the necessary information regarding the convention, filled a large 32 page booklet.

In view of the resolutions that were railroaded through the last annual convention at St. Louis, advocating the repeal of all State ventilation laws, and of the activities of the retiring president, Professor C.-E. A. Winslow, in the advocacy of uncontrollable ventilation for schools, this convention was a matter of considerable interest to those in the heating and ventilating industry.

It is interesting to note that a paper scheduled for presentation in the meeting of the section on Public Health Engineering by Dr. L. H. Greenburg, of the U. S. Public Health Service under the title "What Happened at the Last Meeting of the American Society of Heating and Ventilating Engineers" was stricken from the tentative program, and was replaced by "Opposing Viewpoints in the School Ventilation Controversy" by George T. Palmer, of the American Child Health Association.

OPPOSING VIEWPOINTS IN THE SCHOOL VENTILATION CONTROVERSY

In this paper, opening the session, Mr. Palmer essayed to play Dr. Jekyl and Mr. Hyde by impersonating two clubmates, one a ventilating engineer and the other an advocate of uncontrolled window ventilation. Naturally the latter made all of the touchdowns, although many of the statements made by Mr. Palmer were obvious fumbles. An instance of the logic running through the presentation may be cited. Mr. Palmer, in support of his plea that the present laws requiring 30 cu. ft. of air per min. per pupil said, in effect: "We are faced with these laws requiring 30 cu. ft. of air per minute for each pupil. No one has even attempted to prove to us that double that amount of air would be detrimental to the health of the child." Strangely enough he failed to consider the possibilities of a system such as he was advocating, where the air delivery *is more apt to be one-half of that quantity rather than twice it.*

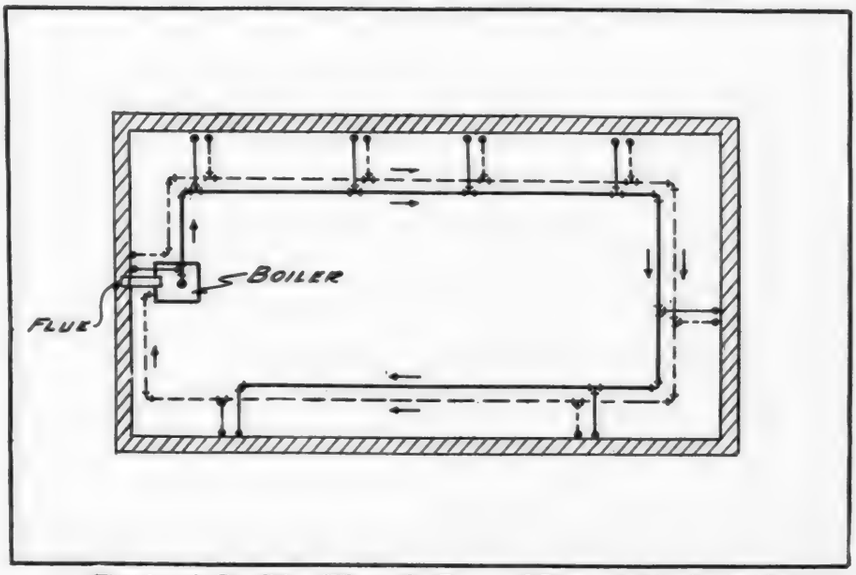


Fig. 4. A Condition Where the Reversed Return Is Not Desirable

TESTS ON DUST, FUMES AND SMOKES

Professor Philip Drinker, of the School of Public Health, Harvard University, presented, in an admirable way, the story of a series of tests in which inhalation, retention and exhalation of dusts, fumes and smokes were studied. What otherwise would have been a dry and uninteresting laboratory report was converted into a fascinating story of research, where every factor was against the experimenter. Even after developing equipment that would make possible measurements of the quantity of dirt that would be retained when breathing dirty air, it was found that no person could breathe twice in exactly the same way, which materially complicated the study.

VENTILATION STANDARDS

Dr. William J. McConnell, Medical Director, Philadelphia Health Council, read a paper on "Ventilation Standards," pointing out the fact that the only scientific research that has been attempted to determine what amosphere was most likely to prove comfortable and healthful had been carried out in the research laboratory of the American Society of Heating and Ventilating Engineers, with the co-operation of the U. S. Public Health Service and the U. S. Bureau of Mines.

THE ROCHESTER SCHOOL VENTILATION TESTS

A progress report on the proposed experiments on school ventilation in Rochester, scheduled to be made by C. M. Baker, chairman of the A. P. H. A. committee on ventilation, was made by R. H. Greenman, of Rochester, chairman of the local joint committee. This report, while not definite, indicated that the tests might go through. In a special meeting called at the conclusion of the session, Mr. Baker asked for any suggestions that might stimulate or assist in rounding out the tests. Mr. Baker was obviously desirous of taking the matter out of the controversial stage where it has been maintained by those interested in uncontrolled or so-called "open window" ventilation, and expressed his hope that it would be possible to conduct such tests as would define proper or optimum atmospheric conditions.

Red Cross Roll Call

The Red Cross Roll Call campaign plan of committee organization contemplates having 200 groups of representatives functioning throughout New York by Armistice Day, involving over 4500 persons. The campaign begins on Armistice Day, November 12, and extends to Thanksgiving Day, November 25. William G. Le Compte, of Jenkins Bros., New York, is the Chairman of the Heating Supply Manufacturers' group and Henry B. Gombers, secretary of the Heating and Piping Contractors Association, New York, is chairman of the Heating Contractors, Piping and Refrigerating group.

Bureau of Heat Control Proposed for New York City

ON the ground that inadequate heat is as great a menace to public health as is inadequate sanitation, a proposal has been made, according to Allen E. Beals, in the Current Dow Service Daily Building Reports, to amend the New York City Building Code to provide for a bureau of heat control. Such a bureau, it is held, could handle the gross abuses in the matter of installation of heating plants in speculatively-built apartment houses.

"It is not unusual," states the report, "for heating contracts to be awarded to so-called heating 'engineers' without first having anything in the way of specifications supplied, upon which to estimate the cost. Estimates are drawn up and submitted to representatives of owners of certain kinds of housing enterprises after the prospective 'engineer' has merely ascertained the height, width and depth of the building and location of the boiler. The result is that, after the building has been completed and tenants are in, the structure has proved so cold and uninhabitable that complaints have had to be made through the courts for adequate relief.

BUILDING INVESTMENTS INVOLVED

"The tenants in the building are not the only ones made victims of the lack of control of heating plant installations. From all parts of the country people are sending small sums to be invested in New York City building construction. Their investments are based upon the ability of the projected building to yield sufficient to make the investment secure and to return interest and, possibly, dividends.

"When, under present practices, so vital a factor in keeping a building well tenanted as heating equipment, is relegated to a place of expediency, convenience or, perhaps, corruption (where inadequately-equipped contractors or 'engineers' are invited to submit figures), the building investor, as well as the uncomfortable lessees, begin to have a personal concern in how to safeguard their interests, if not their health, against such neglect.

"In the case of heat, which helps greatly to make the finished project pay as a going investment, there is now nothing in the building code to insure the owner or the small investor standing behind the corporate owner with his investment, that there will be enough heat in the building to keep the tenants comfortable and contented.

SCHOOL CONDITIONS COMPARED TO HOME CONDITIONS

"The point is made that the construction division of the Board of Education makes careful provision that sufficient heat radiation is provided for the pupil attending school for five hours, but when the child returns from school he stands to spend nineteen hours in a speculatively-built apartment house that has not enough heat radiation in it to keep his body healthfully warm.

TYPICAL HEATING SPECIFICATION

"Many architects do not even include in their specifications details as to heating. Still others write no heating specifications at all. A typical heating section of a specification taken from a great corporation's apartment house operation reads as follows:

> "'To be one-pipe gravity system. Submit layout indicating size of radiators for owner's approval within ten days of signing contract. System to be guaranteed to heat the entire house to 70° in zero weather without forcing.'

"Many of the most reputable heating contractors absolutely refuse to sign a contract under conditions like these. The great speculative construction market of New York City is therefore at the mercy of inadequately equipped 'engineers' who base their estimates on anything but the heating requirements of the job and against whose figures reputable heating contractors cannot compete. There being no license required for heating and ventilating contractors, this branch of the building industry is wide open to any one to enter it, and the owner knows nothing about the incompetence of the heating contractor until he counts up the cost of mistakes, if not actual defalcation.

"The organized and reputable heating contractors of New York City have come to a realization that some corrective measure is necessary, hence the effort now on foot to cure it through the building code."

THOMAS BARWICK URGES EMPLOYMENT OF PROFESSIONAL ENGINEERS AS SOLUTION OF PROBLEM

In commenting on the proposal to establish a bureau of heat control, Thomas Barwick, engineer for Buchman and Kahn, architects, New York, declares that the abuses sought to be remedied are the results of employing incompetent parties, whether calling themselves engineers, contractors, or otherwise.

"The State law," continues Mr. Barwick, "defines engineering in general for licensing. The law requires that any person practicing engineering must take out a State license and it defines certain penalties for accepting fees for such service unless the party is properly certified by the State as a professional engineer. Owners are thereby protected

in their dealings with men so qualified and certified under the State law and if failure of performance occurs, are entitled to consideration in the courts. If an owner neglects to protect himself by employment of contractors or engineers not so licensed, the failure is the owner's loss.

"If an owner employing a qualified licensed engineer to design and not to supervise or certify that the work is in strict accordance with the requirements of the design, it is also the owner's responsibility for any failure.

"In view of this situation, it would hardly seem necessary to provide for a city bureau capable of performing the function of the responsible engineer.

"To provide a city department to cover such a service would entail a great expense for the taxpayers, for the reason that only specialists could pass on the drawings that would be submitted. These specialists are none too many and capable men would need to receive fees or salaries far beyond those that can be offered under civil service rules. In the actual operation of such a bureau, mediocre talent would be employed to check the work of experts. The anomaly would be like asking a radio salesman to pass on the work of a nationally-known inventor.

"In the matter of submitting plans to the Building Bureau and to receiving proper recognition, would it not be better to establish a regulation to the effect that 'plans shall be submitted showing the apparatus as designed and a copy of the specifications certified to by a State licensed engineer, a member of a recognized engineering society, with his license number thereon and date of expiration of license (yearly) before work is commenced on the building,' and that before the certificate of occupancy is provided by the Building Bureau, a signed certificate from the same engineer (except in demise or disfranchisement) stating that the work as done conforms with the plans and specifications. In this manner, the Bureau of Buildings would place the responsibility where it belongs. If the work is not right and the engineer's certificate so states, then the owner (if the work has not been under supervision of the certifying engineer) would be responsible.

"This method would do away with duplication of expense, and avoid incompetence and losses and is the only practical method to conserve health under the law."

"Anthracite" Mixes Facts and Fiction

THE HEATING AND VENTILATING MAGAZINE has made its position perfectly clear in regard to "loose sales talk," particularly in regard to oil-burner advertising. The code of ethics formulated by the magazine, and subscribed to by all of its advertisers and by other leaders in the industry and by non-advertisers, has been characterized as largely instrumental in bringing about better conditions in the industry.

The kind of material that is printed under the caption "Facts and Fiction About the Oil Burner" in the July issue of *Anthracite*, "published by the authority of the Anthracite Operators Conference," falls within the category of "loose sales talk" and certainly can do no good to those interested in the sale of coal. This article takes to task the New York *Field* for an article on oil burning, and, in its criticism, says:

"It is nowhere mentioned in the article that the oil burner constitutes so serious a fire hazard in New York City that the fuel oil rules adopted by the Board of Standards and Appeals provide that 'no fuel oil burning plant shall be operated unless in charge of a person holding a certificate of qualification from the Police Commissioner'."

The citation quoted does not apply, inasmuch as the article, as a whole, is on the subject of *domestic* oil burning, and even the wildest of the many weird provisions in the New York City laws do not contemplate such a thing. No such clause applies to the use of oil for use in house heating.

FIRE HAZARD WITH OIL FUEL IS DECREASING

Again, the positive statement regarding the seriousness of the fire hazard as rendering these laws necessary in New York City is so contrary to the facts as to be funny. It would be interesting if *Anthracite* would ask the National Board of Fire Underwriters and the National Fire Protection Association for statements as to the risks of oil-burning in homes, and print them. As a matter of fact, something over a year ago, a spokesman of the Underwriters, addressing a convention of fire marshals, stated that: "The use of oil fuel should not involve *a materially greater hazard* than the use of the fuel it is designed to replace." Further, as a matter of fact, an analysis of the fire risk involved in the use of oil for house heating just being completed shows that the *present-day oil-burning plant is less of a risk than a coal-burning plant.*

The article then goes on to say that the matter of relative cost of coal and oil is a matter of material concern. This certainly does not check with the returns from a questionnaire sent out by THE HEATING AND VENTILATING MAGAZINE. Practically every householder who had burned both coal and oil stated that he would be willing to pay from 25% to 200% more for the liquid fuel than for coal. This, again, is not a biased statement by a partisan, but represents cold facts.

It is further stated, on the basis of figures "prepared" by a combustion engineer, that the "average cost to heat a ten-room house with coal was $276.00 as against $483.00 for oil heat. This analysis, it is interesting to note, is based on the statement that "as a matter of fact it requires at least 170 gals. of oil to produce the heat units obtainable from one ton of anthracite." The fallacy of this comparison lies, not in the statement itself, which is one based on easy multiplication and division, but in its application. It ignores the fact that, with oil, the over-all efficiency for the heating season is so much higher than with coal that irrefutable evidence shows cases where 100 gals. of oil have been equivalent to a ton of coal—if such an equivalency were logical, which it is not. *No quantity of oil can be equated to a ton of coal as a heating medium.* The fluid fuels produce results which, in the nature of things, cannot be obtained with coal. Therefore, the two classes of fuels cannot properly be equated.

OIL PRICES MISSTATED

Another remarkable statement in the article is to the effect that: "In the past month (June) the price of fuel-oil has increased three cents a gallon, or the equivalent of an increase of $5.10 in the price of coal."

The fact is that fuel-oil for domestic use in New York (which was the location under discussion) had not, for three years varied over half a cent a gallon from 8½c instead of the 11c rate quoted. This price, of course, obtains for oil in tank wagon lots, to the home owner.

There is so much of good that can be done in the coal industry, and among those who want to know how to get the best results with small sizes of anthracite in the home, that it appears extremely unfortunate that those in a position to do constructive work turn their backs to it and in their short sightedness put out the kind of propaganda that can only react to the detriment of the anthracite industry.

Gas Industry's 3-to-5 Years Program

A PROMINENT place in the program of the American Gas Association has been given to the development of domestic use of gas and to a publicity campaign in this connection. A Home Service Department has been organized at headquarters and the association is also co-operating with the Home Owners' Service Institute in drawing plans for model homes, embodying complete installation of gas piping, with provision for minimum quantity of domestic gas installation.

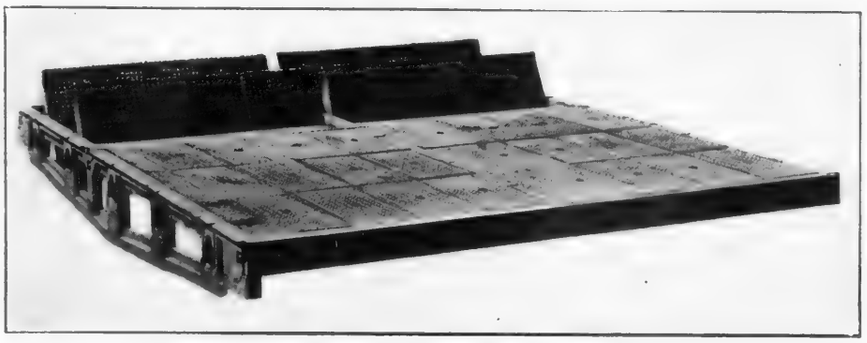
Under the head of "Advertising," a special committee on the subject has recommended an appropriation of $15,000 to be made from the association's treasury, to be used in conducting a national survey of domestic utilities as a necessary preliminary to a comprehensive advertising campaign.

Grates for Burning Small-Sized Anthracite

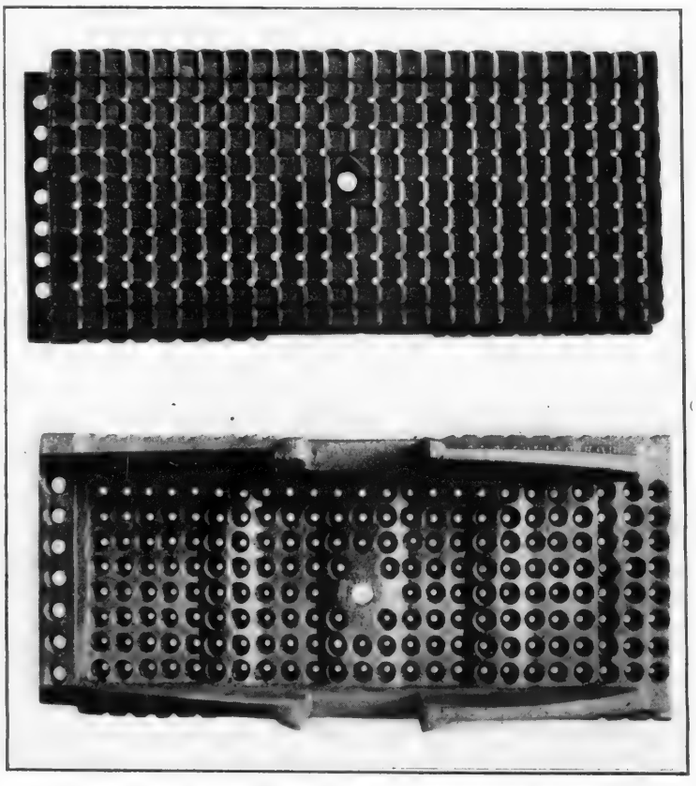
Previous articles in this series are as follows: 1.—Neemes Improved Shaking and Dumping Grate, October, 1926.

2—Johnson

IN THE Johnson patented air-diffused grate, manufactured by the Carbondale Grate-Bar Co., Scranton, Pa., full dumping, combination stationary and dumping, and stationary grates have been provided for burning small-sized anthracite, soft coal and coke. The dump bars, which form the surface of the grate, are made with patented



Johnson Patented Air-Diffused Grate



Top and Bottom Views of Johnson Grate Section

lap sides and ends. This lap enables the bars to be placed far enough apart to prevent buckling up in the fire and burning off. Care is also taken in the design to prevent the air from coming up in large volumes along the sides and ends, causing the fire to burn out in spots and blow air through holes, causing a low CO_2. The holes are made in sizes 3/16 in; 1/4 in.; and 5/16 in., to suit the size of the coal burned.

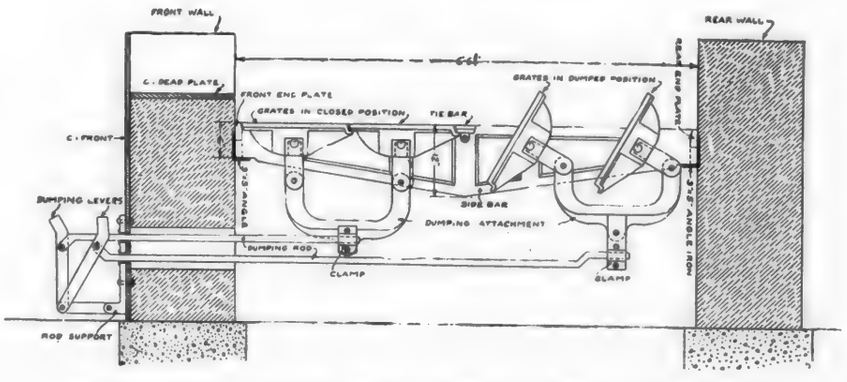
The surface of the dump bar has grooves cut 1/8 in. deep from hole to hole. This is done to provide the required condition, as the air flows through the grooves, to effect satisfactory combustion. Another purpose of these grooves is to eliminate all blow holes in the bed of the fire. The whole design of these bars provides for heavy construction, so as to be able to withstand the high temperatures to which they are subjected.

Cross bars are provided to support the dump bars and are designed heavy to bear the weight and stand the jar and shock. The trunnions on the ends are made of chilled iron to cut the wear to a minimum. A noteworthy feature is that the cross bars are interchangeable.

The sides of the journal bars support the cross bars and form part of the grate. They have removable chilled journal boxes for the cross bars to work in and, when worn out, can be replaced at small cost.

3—Rath

THE coal bill, which is one of the largest single items in the maintenance of any building, is subject to considerable reduction when improvements in grate design are introduced, not only for burning more efficiently the cheaper grades of fuel, but also for consuming the coal gases formerly wasted. This method of cutting down the heating bill has the additional merit that, while it permits the introduction of a cheaper grade of coal, it does not



Section of Johnson Grate, Showing Closed and Dumping Positions

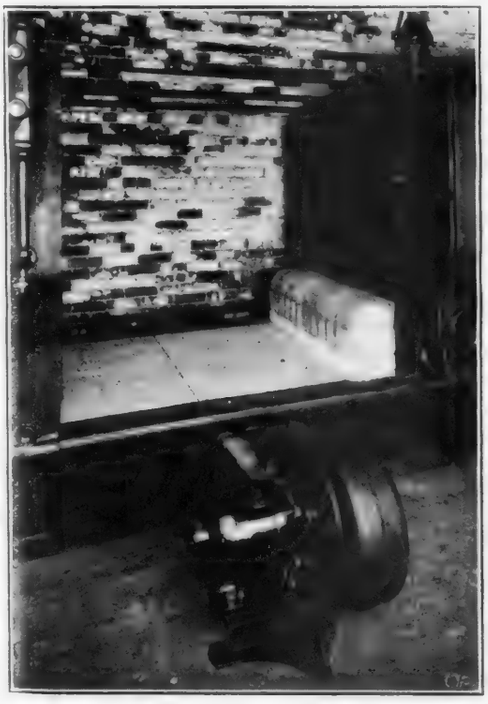
require a complete replacement of the plant, a simple alteration of existing facilities usually being sufficient.

The Rathgeb Grate Company, 16 East 43rd Street, New York, has developed a grate cooled by air and constructed of high-temperature iron, to be used in connection either with the cheapest grade of anthracite, or with bituminous coal.

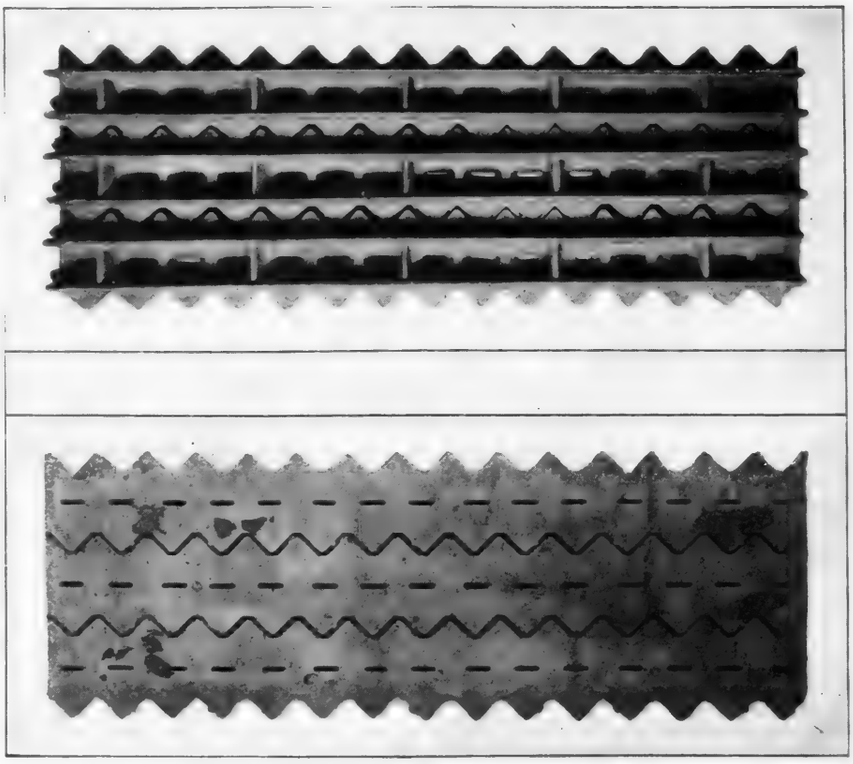
Perhaps the most interesting feature of this grate is the use of the Rath double-combustion principle for preventing the waste of coal gas. The basic idea of this construction is to preheat the air to a point near the temperature of the gases above the coal bed. It then mixes with these gases and in that way thorough combustion is effected. Fresh oxygen is drawn from the ash pit in a specially-constructed heat chamber, embedded in the bridgewall of the boiler. The oxygen is checked by baffle plates and retained in the chamber, the purpose being to keep it there until properly heated. It is then forced through distributors in thin, rapidly-moving streams over the surface of the fuel bed.

It follows that, once this object is accomplished, the extra oxygen introduced takes care of gases from even the most compact fuel bed. This means that the smallest sizes of anthracite, commonly classed as buckwheat, rice and barley, can be used with the resultant economy that comes from the lower prices at which this grade of coal is sold.

Air is introduced into the ash pit by means of forced-draft equipment, which is automatically controlled and regulated in connection with the steam pressure. The air entering the boiler pit is intended to be sufficient not only for the proper combustion of coal upon the grates, but also for use in the heat chamber for distribution over the fuel bed.



Typical Installation of Rath Grate



Top and Bottom Views of Rath Grate Section

A. G. A. Publishes Prize House Plans with House Heating Data

Designed to place before American architects the prize plans of the 1926 competition for small houses, and at the same time to bring together in concise form the essential technical data on house heating with gas, the architects' and builders' service committee of the American Gas Association has prepared an attractive folder containing 40 pages, bound in a heavy file cover.

Under the head of "Gas Service and Appliances for the Home" the following subjects are treated briefly, but with no salient point omitted: gas appliance installation; gas consumption of domestic gas appliances; proper piping for domestic gas service; flues for safe gas use in the home; the kitchen range; hot water service; heating the whole house with gas; the basement a new living room; incinerators and refrigeration by gas.

The Iso-Degree-Day Chart, developed for THE HEATING AND VENTILATING MAGAZINE is reproduced, and its use outlined in the section on "Heating the Whole House With Gas."

Nine of the prize-winning plans and five of the honorable mention plans are reproduced, with cubage figures.

General Magazines Discuss Domestic Oil Burning

An indication of the public interest in the subject of domestic oil burning is shown in the reproduction in the *Literary Digest* for October 16, 1926, of an article entitled, "What Oil Burner Shall I Buy?" which appeared originally in *Popular Science Monthly*. This article was written by P. E. Fansler, associate editor of THE HEATING AND VENTILATING MAGAZINE, and was illustrated with typical diagrams showing three principles of oil burner operation, which are characteristic of those in general use.

In presenting this article, the *Literary Digest* says:

"There is no 'best' burner," declares P. E. Fansler. "In an article entitled, 'What Oil Burner Shall I Buy?' contributed to *Popular Science Monthly*, (New York) he tells us what we may expect from the various types of burners and the factors that should determine a choice. 'Many satisfactory makes are now on the market,' he says, 'and anyone will give complete heating comfort. Each has its own particular advantages and features, but to make an intelligent choice, it is necessary to get clearly in mind some of the basic principles of oil-burner operation.'"

The writer then quotes at length from *Popular Science Monthly* articles.

Present Practice in Vapor Heating

Previous articles in this series are:

1. *Webster Type R Modulation System, August*, 1926.
2. *Dunham Home Heating System, August*, 1926.
3. *The Illinois System, September*, 1926.
4. *Hoffman Controlled Heat, September*, 1926.
5. *The Mouat System, October*, 1926.

6. The Trane System

TRANE vapor heating is a two-pipe steam system using special boiler and radiator devices which allow the system to operate under ounces instead of pounds of pressure.

A typical layout of the Trane system is shown in Fig. 1. The specialties used consist of a vapor regulator for controlling the draft, a direct-return trap, a vapor-vacuum gauge for showing the boiler pressure, a bellows-packless supply valve for each radiator inlet, a 14-corrugation bellows trap for each radiator return connection, and vents for venting the air from the system into the basement instead of into the heated rooms through radiator air valves.

The Trane bellows-packless valve (Fig. 2) used on the supply pipe to the radiator provides what is described as a leak-proof means of regulating the supply of vapor to the radiator. The use of the Trane bellows makes valve packing unnecessary and the body is globular, assuring full capacity through the valve.

The Trane 14-corrugation bellows trap (Fig. 3) is used on the radiator-return connection. This trap has the balanced

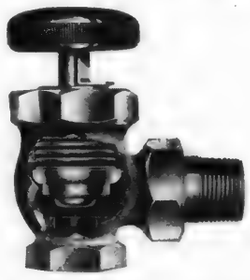


Fig. 2. Trane Bellows Packless Radiator Valve

pressure feature—the same pressure on the inside of the bellows as on the outside—which enables it to be used on a pressure range of from 15 in. vacuum to 25 lbs. pressure, or higher, without danger. Its specially-made bellows is guaranteed for a period of five years. It is designed to close against steam but to open to allow condensation, air, and gases to flow into the return.

All Trane systems are made safe by the use of a direct return trap (Fig. 4). If for any reason, due to faulty handling or carelessness, the fire is allowed to burn too vigorously and a pressure is created on the system so that the water will not return to the boiler by gravity, the water fills up the body of the direct-return trap, lifting the float. When the

Fig. 3. Trane Bellows Radiator Trap

float reaches the top, the steam valve in the top of the direct-return trap opens and equalizes the pressure between the boiler and the direct-return trap. This allows the water from the trap to flow back into the boiler by gravity. This operation is continuous and automatic as long as there is pressure on the boiler in excess of that required.

The vapor regulator, shown in Fig. 5, is connected into the steam dome on

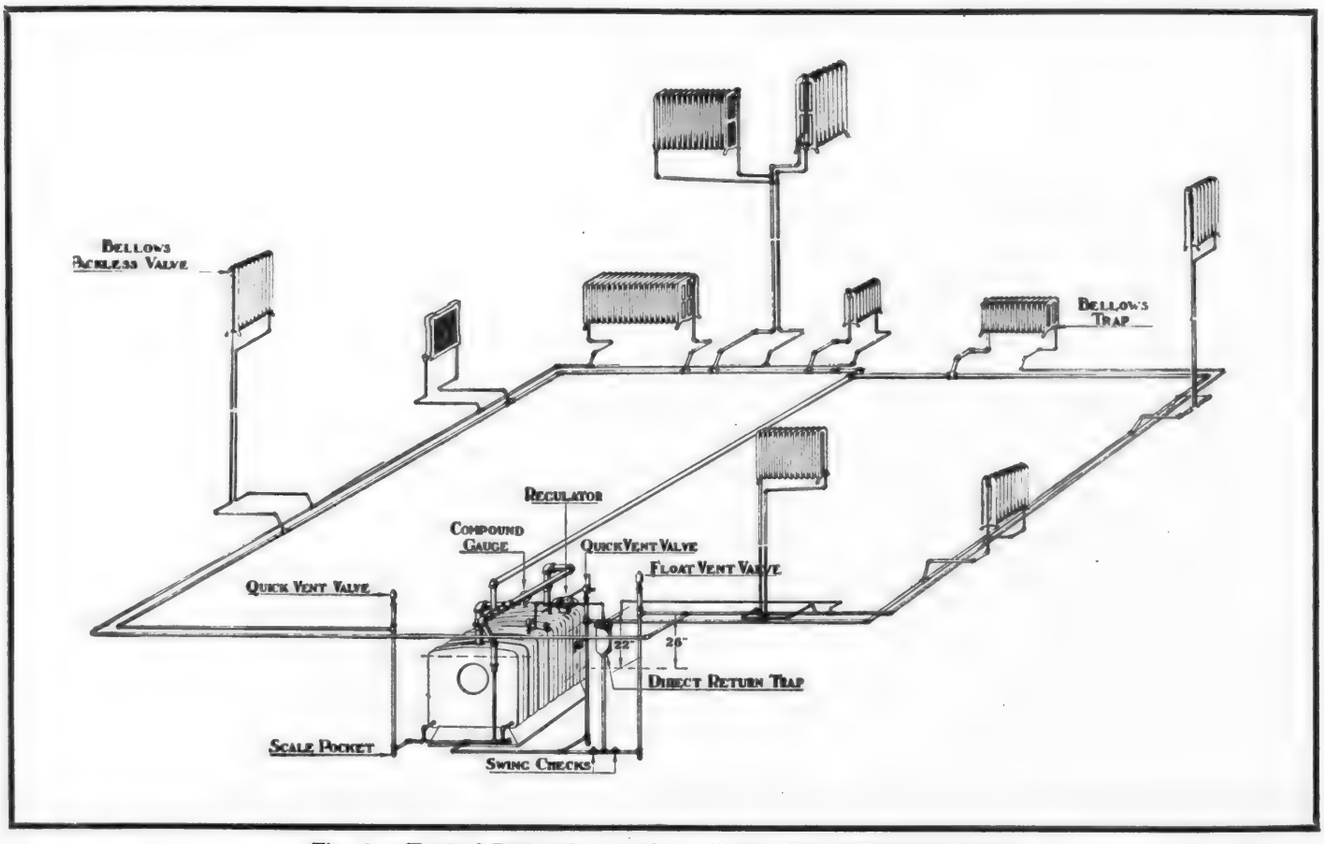


Fig. 1. Typical Piping Layout for a Trane Vapor Heating System

top of the boiler, and chains run from the end of the lever arm to the draft door and to the check draft in the smoke pipe. The pressure in the boiler operates on the body of water in the bottom of the regulator, which in turn, forces up the large diaphragm connected to the lever arm, closing the draft as the pressure increases, and opening it again as the boiler pressure goes down. An adjustable weight on the lever arm is provided to permit any desired boiler pressure to be maintained.

The vapor-vacuum gauge (Fig. 6) is especially designed for vapor-vacuum work. It is installed on the top of the boiler and has a working pressure of from 18 in. vacuum to 30 lbs. pressure.

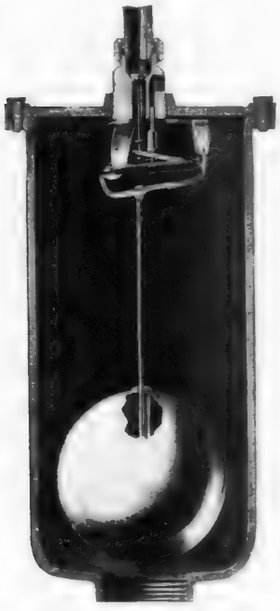


Fig. 4. Trane Direct-Return Trap

The quick vents and float vents (Figs. 7 and 8) are placed on the return mains at the points of dropping for the purpose of removing the air from the system, thus making it possible for the steam vapor to flow along without resistance. Both types of vents are equipped with the regular Trane bellows. A small aluminum flap at the top of the venting port operates to keep the air out of the system once it is expelled.

The quick vent is located at the end of the steam main and is constructed to vent air from the system but to

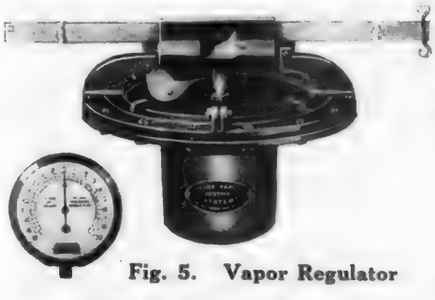


Fig. 5. Vapor Regulator

Fig. 6. (at left) Vapor Vacuum Gauge

Fig. 7. Quick-Vent Valve

Fig. 8. Float Vent Valve

close against steam. The float vent is equipped with a special float device that enables it to close tightly against water as well as steam. The use of the Trane bellows makes it possible for both vents to close and stay closed when there is a vacuum on the system.

Program for Sales and Advertising Managers' Conference Indicates Wide Scope of Activities

For the sixth annual sales and advertising managers' conference, to be held at the Palmer House in Chicago on November 11 and 12, a program of wide scope has been arranged.

The problem of securing more public attention for our industries will be dealt with and a definite plan of action submitted for discussion at the meeting. The program planned by the National Trade Extension Bureau for 1927 will also be discussed and rounded out. Attendance at this conference is not limited merely to sales and advertising managers, but is planned to embrace everyone interested in developing our national industries and making 1927 the biggest year in our business history. The program for the conference is as follows:

MORNING SESSION—NOVEMBER 11

Co-ordinating the Sales and Advertising Activities in Our Industries.

(a) Finding the Logical Market and Getting Publicity Coverage in It.
(b) Tying-in the Dealer and Contractor to Sales and Advertising Effort.
(c) Discussion Period.

AFTERNOON SESSION—NOVEMBER 11

Focusing Public Attention on Our Industries.

(a) What Has Been Done by Other Industries and Its Effect.
(b) What Our Industries Can Do to Get Increased Public Attention.
(c) Discussion Period.

MORNING SESSION—NOVEMBER 12

Charting Our Course for 1927.

(a) The Business Problems that T.E.B. is Solving.
(b) Making Balanced Management Increase Sales for 1927.
(c) Discussion Period.

AFTERNOON SESSION—NOVEMBER 12

Injecting More Vigor Into Our Industries.

(a) What Enthusiasm Will Do.
(b) What the Manufacturer and Wholesaler Can Do.
(c) The Manufacturers' and Wholesalers' Salesmen as an Inspirational Force.
(d) Discussion Period.

Water-Tube Boilers for Steam Heating

In connection with an item in THE HEATING AND VENTILATING MAGAZINE for October, on the suitability of steel water-tube boilers for steam heating, attention has been directed to recent types of water-tube boilers which are designed primarily for use with oil. In some types, provision can be made for installing grates for coal firing.

The article referred to dealt with standard types of power steel water-tube boilers long on the market and sometimes used for heating and from which the more recent types are a radical departure, embodying as they do, a number of advantages formerly not obtainable in the water-tube boiler.

One boiler of this newer type in no way resembles the familiar power water-tube boiler, with its steel drum and straight inclined tubes, as the tubing is arranged in zigzag shape, so that an unusual amount of heating surface is contained in a small space. Another type of boiler, though appearing somewhat in the same form as the power water-tube type, has been designed for lightness in weight, with readily accessible tubing for cleaning and ability to go through a 30-in. door. Both of these boilers are typical of the alteration in types being brought about through the increasing use of oil burners.

Of course, like all new departures, the test of time must be applied before such boilers may be accorded the same classification as the older types which have passed through many years of service.

Officers Nominated for American Society of Mechanical Engineers

The following members have been nominated for office by the American Society of Mechanical Engineers: President, Charles M. Schwab; vice-presidents, Charles L. Newcomb, Everett O. Eastwood, and E. R. Fish; treasurer, Erik Oberg, for re-election.

Cleveland Heating Contractors at Institute of Thermal Research, Buffalo, N. Y.

Cleveland Heating Contractors Guests of the Thermal Research Laboratory

A notable event in the heating industry was the recent trip taken by 72 members of the Heating and Piping Contractors Cleveland Association to the Thermal Research Laboratory and manufacturing plants of the American Radiator Company at Buffalo.

The members left Cleveland on the See-and-Bee, August 18, for Buffalo. They were met at the boat by a fleet of sight-seeing buses which transported them throughout the day to the various plants of the American Radiator Company. In the afternoon tests were conducted in the Thermal Research Laboratory on various sizes of boilers. Most interesting results were obtained by the use of glass outlet pipes on several boilers, showing the effect of dirt and grease in boiler operation.

Following the tests at the laboratory the buses took the group on a tour of Niagara Falls where dinner was served in the ball room of the Niagara Hotel. Entertainment was furnished by members of the Cleveland group after which the party left on the buses for Buffalo and the trip home.

The significant feature of this trip was the desire on the part of the contractors to spend their time and money in visiting other cities for the purpose of learning more concerning their industry. The good fellowship that prevailed added considerably to the pleasure of the trip.

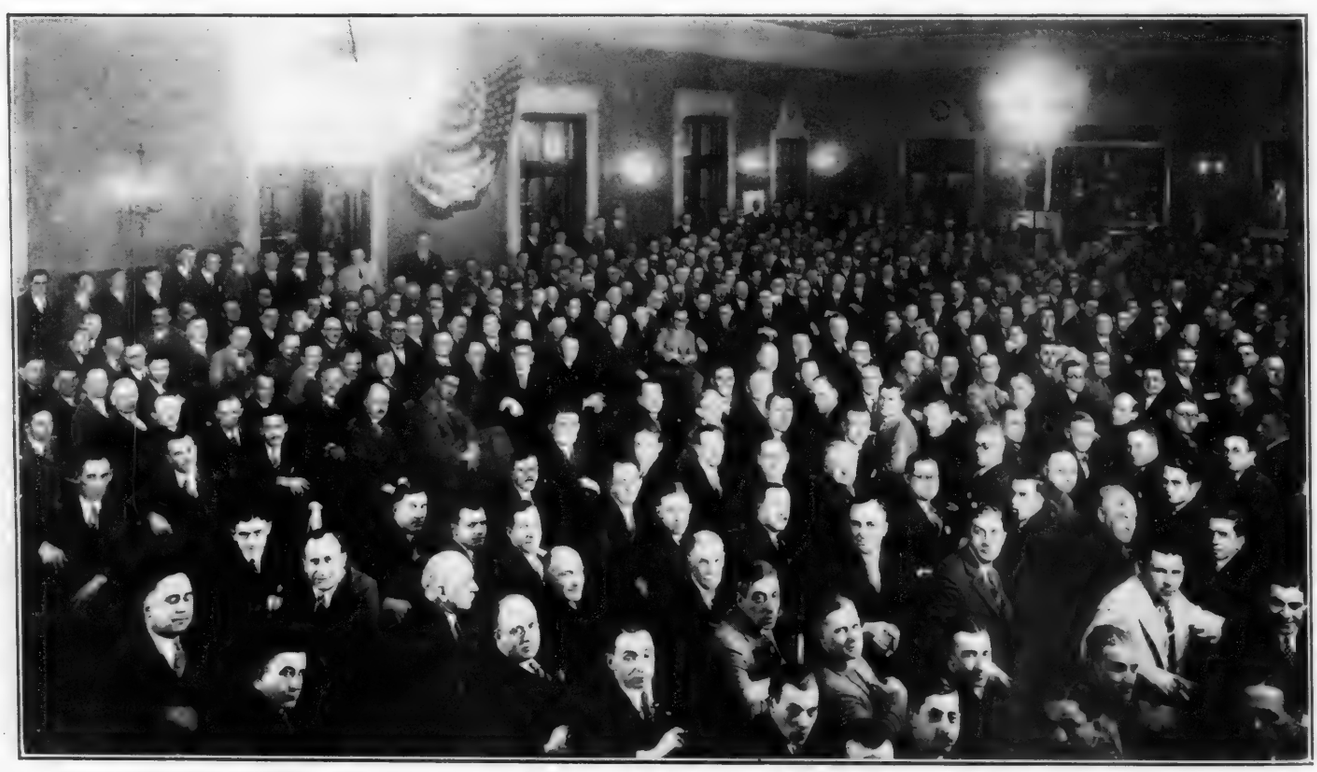
The Cleveland association is planning several other similar trips.

Hoffman Specialty Company's Sales Meeting

A trade gathering, which was unique in respect to the character and number of guests present, was staged by the Hoffman Specialty Company of New York, at the Hotel Commodore, on 42nd Street, New York, September 29. The meeting took the form of a smoker and supper and marked the inauguration of the company's campaign, featuring the Hoffman No. 2 vacuum valve for one-pipe heating systems.

Other meetings of a similar nature were held in Boston, September 27, and in Philadelphia, October 1.

Most of the guests at the New York meeting comprised jobbers and their representatives and heating and plumbing contractors. The large banquet room of the hotel was crowded when George



Hoffman Specialty Company's Sales Meeting, Hotel Commodore, New York

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																	
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L. P		
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"	16
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225	55.0	65.0	22.5	45.0	90.0	180	21.0	16.0	13.0	19.0	14.5	12.5	13.5	11.5	10.5	15.0	13.0	11.0	30.0	24.0	20.5	25.0	20.0	17
1	4.09	3.46	10.0	5.00	2.50	1.25	10.7	14.1	17.3	11.9	15.5	18.0	16.7	19.6	21.4	15.0	17.3	20.5	7.50	9.38	11.0	9.00	11.3	13
2	8.18	6.92	20.0	10.0	5.00	2.50	21.4	28.2	34.6	23.8	31.0	36.0	33.4	39.2	42.8	30.0	34.6	41.0	15.0	18.8	22.0	18.0	22.6	26
3	12.3	10.4	30.0	15.0	7.50	3.75	32.1	42.3	51.9	35.7	46.5	54.0	50.1	58.8	64.2	45.0	51.9	61.5	22.5	28.1	33.0	27.0	34.9	39
4	16.4	13.8	40.0	20.0	10.0	5.00	42.8	56.4	69.2	47.6	62.0	72.0	66.8	78.4	85.6	60.0	69.2	82.0	30.0	37.5	44.0	36.0	45.2	52
5	20.5	17.3	50.0	25.0	12.5	6.25	53.5	70.5	86.5	59.5	77.5	90.0	83.5	98.0	107	75.0	86.5	103	37.5	46.9	55.0	45.0	56.5	66
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8	32.7	27.7	80.0	40.0	20.0	10.0	85.6	113	138	95.2	124	144	134	157	171	120	138	164	60.0	75.0	88.0	72.0	90.4	1
9	36.8	31.1	90.0	45.0	22.5	11.3	96.3	127	156	107	140	162	150	176	193	135	156	185	67.5	84.4	99.0	81.0	102	1
10	40.9	34.6	100	50.0	25.0	12.5	107	141	173	119	155	180	167	196	214	150	173	205	75.0	93.8	110	90.0	113	1
11	45.0	38.1	110	55.0	27.5	13.8	118	155	190	131	171	198	184	216	235	165	190	226	82.5	103	121	99.0	124	1
12	49.1	41.5	120	60.0	30.0	15.0	128	169	208	143	186	216	200	235	257	180	208	246	90.0	113	132	108	136	1
13	53.2	45.0	130	65.0	32.5	16.3	139	183	225	155	202	234	217	255	278	195	225	267	97.5	122	143	117	147	1
14	57.3	48.4	140	70.0	35.0	17.5	150	197	242	167	217	252	234	274	300	210	242	287	105	131	154	126	158	1
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16	65.4	55.4	160	80.0	40.0	20.0	171	226	277	190	248	288	267	314	342	240	277	328	120	150	176	144	181	2
17	69.5	58.8	170	85.0	42.5	21.3	182	240	294	202	264	306	284	333	364	255	294	349	128	159	187	153	192	2
18	73.6	62.3	180	90.0	45.0	22.5	193	254	311	214	279	324	301	353	385	270	311	369	135	169	198	162	203	2
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20	81.8	69.2	200	100	50.0	25.0	214	282	346	238	310	360	334	392	428	300	346	410	150	188	220	180	226	2
21	85.9	72.7	210	105	52.5	26.3	225	296	363	250	326	378	351	412	449	315	363	431	158	197	231	189	237	2
22	90.0	76.1	220	110	55.0	27.5	235	310	381	262	341	396	367	431	471	330	381	451	165	206	242	198	249	2
23	94.1	79.6	230	115	57.5	28.8	246	324	398	274	357	414	384	451	492	345	398	472	173	216	253	207	260	3
24	98.2	83.0	240	120	60.0	30.0	257	338	415	286	372	432	401	470	514	360	415	492	180	225	264	216	271	3
25	102	86.5	250	125	62.5	31.3	268	353	433	298	388	450	418	490	535	375	433	513	188	235	275	225	283	3

For Methods of Using Table See Back of Sheet.

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																	
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L. P.		
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"	16"
	1.1	1.3	0.45	0.9	1.8	3.6	42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	60	.48	.41	.50	40	.34
225	27.5	32.5	11.25	22.5	45.0	90.0	10.5	8.00	6.50	9.50	7.25	6.25	6.75	5.75	5.25	7.50	6.50	5.50	15.0	12.0	10.25	12.5	10.0	8.5
1	8.18	6.92	20.0	10.0	5.0	2.5	21.4	28.1	34.6	23.7	31.0	36.0	33.3	39.1	42.9	30.0	34.6	40.9	15.0	18.8	22.0	18.0	22.5	26.
2	16.4	13.8	40.0	20.0	10.0	5.0	42.8	56.2	69.2	47.4	62.0	72.0	66.6	78.2	85.8	60.0	69.2	81.8	30.0	37.6	44.0	36.0	45.0	53.
3	24.5	20.8	60.0	30.0	15.0	7.5	64.6	84.3	104	71.1	93.0	108	99.9	117	129	90.0	104	.123	45.0	56.4	66.0	54.0	67.5	79.
4	32.7	27.7	80.0	40.0	20.0	10.0	85.6	112	138	94.8	124	144	133	156	172	120	138	164	60.0	75.2	88.0	72.0	90.0	10
5	40.9	34.6	100	50.0	25.0	12.5	107	141	173	119	155	180	167	196	215	150	173	205	75.0	94.0	110	90.0	113	13
6	49.1	41.5	120	60.0	30.0	15.0	128	169	208	142	186	216	200	235	257	180	208	245	90.0	113	132	108	135	15
7	57.3	48.4	140	70.0	35.0	17.5	150	197	242	166	217	252	233	274	300	210	242	286	105	132	154	126	158	18
8	65.4	55.4	160	80.0	40.0	20.0	171	225	277	190	248	288	266	313	343	240	277	327	120	150	176	144	180	21
9	73.6	62.3	180	90.0	45.0	22.5	193	253	311	213	279	324	300	352	386	270	311	368	135	169	198	162	203	23
10	81.8	69.2	200	100	50.0	25.0	214	281	346	237	310	360	333	391	429	300	346	409	150	188	220	180	225	26
11	90.0	76.1	220	110	55.0	27.5	235	309	381	261	341	396	366	430	472	330	381	450	165	207	242	198	248	29
12	98.2	83.0	240	120	60.0	30 0	257	337	415	284	372	432	400	469	515	360	415	491	180	226	264	216	270	31
13	106	90.0	260	130	65.0	32.5	278	365	450	308	403	468	433	508	558	390	450	532	195	244	286	234	293	34
14	114	96.9	280	140	70.0	35.0	300	393	484	332	434	504	466	547	601	420	484	573	210	263	308	252	315	37
15	123	104	300	150	75.0	37.5	321	422	519	356	465	540	500	587	644	450	519	614	225	282	330	270	338	39
16	131	111	320	160	80.0	40.0	342	450	554	379	496	576	533	626	686	480	554	654	240	301	352	288	360	42
17	139	118	340	170	85.0	42.5	364	478	588	403	527	612	566	665	729	510	588	695	255	320	374	306	383	45
18	147	125	360	180	90.0	45.0	385	506	623	427	558	648	599	704	772	540	623	736	270	338	396	324	405	47
19	155	131	380	190	95.0	47.5	407	534	657	450	589	684	633	743	815	570	657	777	285	357	418	342	428	50
20	164	138	400	200	100	50.0	428	562	692	474	620	720	666	782	858	600	692	818	300	376	440	360	450	53
21	172	145	420	210	105	52.5	449	590	727	498	651	756	699	821	901	630	727	859	315	395	462	378	473	55
22	180	152	440	220	110	55.0	471	618	761	521	682	792	733	860	944	660	761	900	330	414	484	396	495	58
23	188	159	460	230	115	57.5	492	646	796	545	713	828	766	899	987	690	796	941	345	432	506	414	518	61
24	196	166	480	240	120	60.0	514	674	830	569	744	864	799	938	1030	720	830	982	360	451	528	432	540	63
25	204	173	500	250	125	62.5	535	703	865	593	775	900	833	978	1073	750	865	1023	375	470	550	450	563	66

For Methods of Using Table See Back of Sheet.

TORS NATIONAL ASSOCIATION
ESTIMATING TABLE
FOR QUANTITIES INDICATED

ruction than that Shown See Heating and Piping Contractors National Association Engineering Standards.

WASHINGTON, D. C.

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	$70°=T_1$	N	1.20	S	1.00
Base Temperature	$+20°=T_2$	NE	1.00	SW	1.00
Base Temp. +20° Equivalent to		E	1.00	W	1.20
Guarantee Temp. of 4-5° Outside		SE	1.00	NW	1.20

Conc. Fur L. P. 8"	Conc. Fur L. P. 12"	Conc. Fur L. P. 16"	Frame Std.	Frame No Sh'g	Frame No L. P.	ROOF T&G on 1" Bd.	ROOF T&G on 4" Conc.	ROOF Sh'gle on Sh'g	ROOF Sh'gle Sh'g L. P.	Base Floor Conc. on Earth	Base Floor Wood on Sleep.	Interm'e Floor 4" Conc.	Interm'e Floor 4" Conc. 3" Fill 1" Fin.	Interm'e Floor Double Wood	Ceiling Lath and Plas.	Ceiling L & P Wo. Fl. Over	Partition Stud L & P 1 Side	Partition Stud L & P 2 Side		Type Kind Thick.
.50	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		K
25.0	20.0	17.0	12.0	15.5	17.5	15.0	30.0	20.0	15.0	7.75	3.25	5.00	3.75	5.00	12.25	7.00	15.0	8.25		K(T1-T2)
9.00	11.3	13.2	18.7	14.5	12.9	15.0	7.50	11.3	15.0	29.0	69.2	45.0	60.0	45.0	18.0	32.2	15.0	27.3		1
18.0	22.6	26.4	37.4	29.0	25.8	30.0	15.0	22.6	30.0	58.0	138	90.0	120	90.0	36.0	64.4	30.0	54.6		2
27.0	34.9	39.6	56.1	43.5	38.7	45.0	22.5	34.9	45.0	87.0	208	135	180	135	54.0	96.6	45.0	81.9		3
36.0	45.2	52.8	74.8	58.0	51.6	60.0	30.0	45.2	60.0	116	277	180	240	180	72.0	129	60.0	109		4
45.0	56.5	66.0	93.5	72.5	64.5	75.0	37.5	56.5	75.0	145	346	225	300	225	90.0	161	75.0	137		5
54.0	67.8	79.2	112	87.0	77.4	90.0	45.0	67.8	90.0	174	415	270	360	270	108	193	90.0	164		6
63.0	79.1	92.4	131	102	90.3	105	32.5	79.1	105	203	484	315	420	315	126	225	105	191		7
72.0	90.4	106	150	116	103	120	60.0	90.4	120	232	554	360	480	360	144	258	120	218		8
81.0	102	119	168	131	116	135	67.5	102	135	261	623	405	540	405	162	290	135	246		9
90.0	113	132	187	145	129	150	75.0	113	150	290	692	450	600	450	180	322	150	273		10
99.0	124	145	206	160	142	165	82.5	124	165	319	761	495	660	495	198	354	165	300		11
108	136	158	225	174	155	180	90.0	136	180	348	830	540	720	540	216	386	180	328		12
117	147	172	244	189	168	195	97.5	147	195	377	900	585	780	585	234	419	195	355		13
126	158	185	262	205	181	210	105	158	210	406	969	630	840	630	252	451	210	382		14
135	170	198	281	218	194	225	113	170	225	435	1038	675	900	675	270	483	225	410		15
144	181	211	300	232	206	240	120	181	240	464	1107	720	960	720	288	515	240	437		16
153	192	224	318	247	219	255	128	192	255	493	1176	765	1020	765	306	547	255	464		17
162	203	238	337	261	232	270	135	203	270	522	1246	810	1080	810	324	580	270	491		18
171	215	251	355	276	245	285	143	215	285	551	1315	855	1140	855	342	612	285	519		19
180	226	264	374	290	258	300	150	226	300	580	1384	900	1200	900	360	644	300	546		20
189	237	277	392	305	271	315	158	237	315	609	1453	945	1260	945	378	676	315	573		21
198	249	290	411	319	284	330	165	249	330	638	1522	990	1320	990	396	708	330	601		22
207	260	304	430	334	297	345	173	260	345	667	1592	1035	1380	1035	414	741	345	628		23
216	271	317	449	348	310	360	180	271	360	696	1661	1080	1440	1080	432	773	360	655		24
225	283	330	467	363	323	375	188	283	375	725	1730	1125	1500	1125	450	805	375	683		25

←——These Items Figured on Basis of K $\left(\frac{T_1-T_2}{2'}\right)$ ——→

TORS NATIONAL ASSOCIATION
ESTIMATING TABLE
FOR QUANTITIES INDICATED

ction than that Shown See Heating and Piping Contractors National Association Engineering Standards.

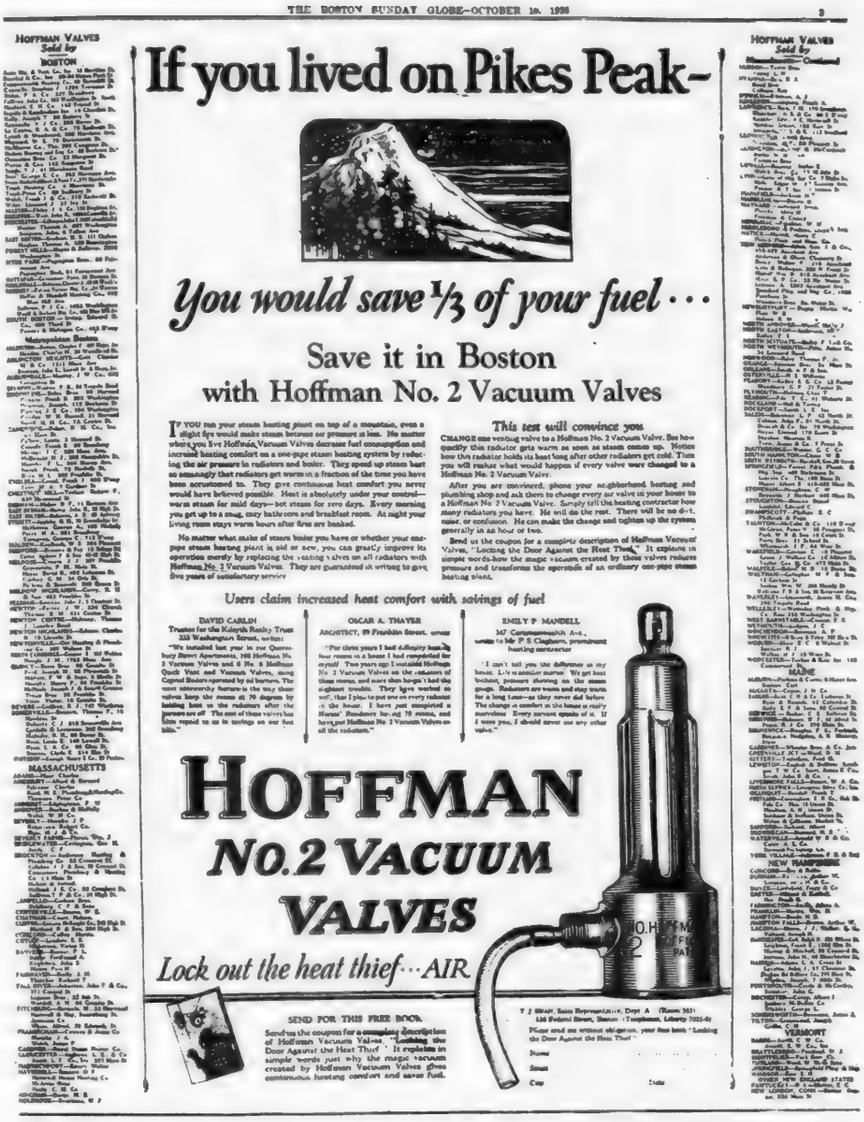
SAN FRANCISCO

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	$70°=T_1$	N	1.20	S	1.00
Base Temperature	$+45°=T_2$	NE	1.20	SW	1.00
Base Temp. +45° Equivalent to		E	1.20	W	1.00
Guarantee Temp. of +30° Outside		SE	1.00	NW	1.15

Conc. Fur L. P. 8"	Conc. Fur L. P. 12"	Conc. Fur L. P. 16"	Frame Std.	Frame No Sh'g	Frame No L. P.	ROOF T&G on 1" Bd.	ROOF T&G on 4" Conc.	ROOF Sh'gle on Sh'g	ROOF Sh'gle Sh'g L. P.	Base Floor Conc. on Earth	Base Floor Wood on Sleep.	Interm'e Floor 4" Conc.	Interm'e Floor 4" Conc. 3" Fill 1" Fin.	Interm'e Floor Double Wood	Ceiling Lath and Plas.	Ceiling L & P Wo. Fl. Over	Partition Stud L & P 1 Side	Partition Stud L & P 2 Side		Type Kind Thick.
.50	40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		K
12.5	10.0	8.50	6.00	7.75	8.75	7.50	15.0	10.0	7.50	3.875	1.625	2.50	1.875	2.50	6.125	3.50	7.50	4.125		K(T1-T2)
18.0	22.5	26.5	37.5	29.0	25.7	30.0	15.0	22.5	30.0	58.1	138.5	90.0	120	90.0	36.7	64.3	30.0	54.6		1
36.0	45.0	53.0	75.0	58.0	51.4	60.0	30.0	45.0	60.0	116	277	180	240	180	73.4	129	60.0	109		2
54.0	67.5	79.5	113	87.0	77.1	90.0	45.0	67.5	90.0	174	416	270	360	270	110	193	90.0	164		3
72.0	90.0	106	150	116	103	120	60.0	90.0	120	232	554	360	480	360	147	257	120	218		4
90.0	113	133	188	145	129	150	75.0	113	150	291	693	450	600	450	184	322	150	273		5
108	135	159	225	174	154	180	90.0	135	180	349	831	540	720	540	220	386	180	328		6
126	158	186	263	203	188	210	105	158	210	407	970	630	840	630	257	450	210	382		7
144	180	212	300	232	206	240	120	180	240	465	1108	720	960	720	294	514	240	437		8
162	203	239	338	261	231	270	135	203	270	523	1247	810	1080	810	330	579	270	491		9
180	225	265	375	290	257	300	150	225	300	581	1385	900	1200	900	367	643	300	546		10
198	248	292	413	319	283	330	165	248	330	639	1524	990	1320	990	404	707	330	601		11
216	270	318	450	348	308	360	180	270	360	697	1662	1080	1440	1080	440	772	360	655		12
234	293	345	488	377	334	390	195	293	390	755	1801	1170	1560	1170	477	836	390	710		13
252	315	371	525	406	360	420	210	315	420	813	1939	1260	1680	1260	514	900	420	764		14
270	338	398	563	435	386	450	225	338	450	872	2078	1350	1800	1350	551	965	450	819		15
288	360	424	600	464	411	480	240	360	480	930	2216	1440	1920	1440	587	1029	480	874		16
306	383	451	638	493	437	510	255	383	510	988	2355	1530	2040	1530	624	1093	510	928		17
324	405	477	675	522	463	540	270	405	540	1046	2493	1620	2160	1620	661	1157	540	983		18
342	428	504	713	551	488	570	295	428	570	1104	2632	1710	2280	1710	697	1222	570	1037		19
360	450	530	750	580	514	600	300	450	600	1162	2770	1800	2400	1800	734	1286	600	1092		20
378	473	557	788	609	540	630	315	473	630	1220	2908	1890	2520	1890	771	1350	630	1147		21
396	495	583	825	638	565	660	330	495	660	1278	3047	1980	2640	1980	807	1415	660	1201		22
414	518	610	863	667	591	690	345	518	690	1336	3186	2070	2760	2070	844	1479	690	1256		23
432	540	636	900	696	617	720	360	540	720	1394	3324	2160	2880	2160	881	1543	720	1310		24
450	563	663	938	725	643	750	375	563	750	1453	3463	2250	3000	2250	918	1608	750	1365		25

Data Sheets Nos. 13 U 2 and 13 V 2

←——These Items Figured on Basis of K $\left(\frac{T_1-T_2}{2'}\right)$ ——→


THE BOSTON SUNDAY GLOBE—OCTOBER 10, 1926

Hoffman Valves Sold by BOSTON

MASSACHUSETTS

Hoffman Valves Sold by VERMONT

If you lived on Pikes Peak—

You would save 1/3 of your fuel . . .

Save it in Boston with Hoffman No. 2 Vacuum Valves

IF YOU ran your steam heating plant on top of a mountain, even a slight fire would make steam because air pressure is less. No matter where you live Hoffman Vacuum Valves decrease fuel consumption and increase heating comfort on a one-pipe steam heating system by reducing the air pressure in radiators and boiler. They speed up steam heat so amazingly that radiators get warm in a fraction of the time you have been accustomed to. They give continuous heat comfort you never would have believed possible. Heat is absolutely under your control—warm steam for mild days—hot steam for zero days. Every morning you get up to a snug, cozy bathroom and breakfast room. At night your living room stays warm hours after fires are banked.

No matter what make of steam boiler you have or whether your one-pipe steam heating plant is old or new, you can greatly improve its operation merely by replacing the existing valves on all radiators with Hoffman No. 2 Vacuum Valves. They are guaranteed in writing to give five years of satisfactory service

This test will convince you

CHANGE one venting valve to a Hoffman No. 2 Vacuum Valve. See how quickly this radiator gets warm as soon as steam comes up. Notice how this radiator holds its heat long after other radiators get cold. Then you will realize what would happen if every valve were changed to a Hoffman No. 2 Vacuum Valve.

After you are convinced, phone your neighborhood heating and plumbing shop and ask them to change every air valve in your house to a Hoffman No. 2 Vacuum Valve. Simply tell the heating contractor how many radiators you have. He will do the rest. There will be no dirt, noise, or confusion. He can make the change and tighten up the system generally in an hour or two.

Send us the coupon for a complete description of Hoffman Vacuum Valves, "Locking the Door Against the Heat Thief." It explains in simple words how the magic vacuum created by these valves reduces pressure and transforms the operation of an ordinary one-pipe steam heating plant.

Users claim increased heat comfort with savings of fuel

DAVID CARLIN
Trustee for the Kilsyth Realty Trust
333 Washington Street, Boston

"We installed last year in our Queensbury Street Apartments, 308 Hoffman No. 2 Vacuum Valves and 6 No. 6 Hoffman Quick Vent and Vacuum Valves, using Capitol Boilers operated by oil burners. The most noteworthy feature is the way these valves keep the rooms at 70 degrees by holding heat on the radiators long after the burners are off. The cost of these valves has thus repaid to us in savings on our fuel bills."

OSCAR A. THAYER
ARCHITECT, 69 Franklin Street, Boston

"For three years I had difficulty heating four rooms in a house I had remodeled for myself. Two years ago I installed Hoffman No. 2 Vacuum Valves on the radiators of these rooms, and since then have had the most noteworthy trouble. They have worked so well, that I plan to put one on every radiator in the house. I have just completed a Nurses' Residence having 70 rooms, and have put Hoffman No. 2 Vacuum Valves on all the radiators."

EMILY P. MANDELL
347 Commonwealth Ave., Boston
(wife of Mr. P. S. Clapham, prominent heating contractor

"I can't tell you the difference in my house. It's another matter. We get heat instant, pressure showing on the steam gauge. Radiators are warm and stay warm for a long time—as they never did before. The change in comfort in the house is really marvelous. Every servant speaks of it. If I were you, I should never use any other valves."

HOFFMAN
NO. 2 VACUUM
VALVES

Lock out the heat thief···AIR

SEND FOR THIS FREE BOOK

Send us the coupon for a complete description of Hoffman Vacuum Valves, "Locking the Door Against the Heat Thief." It explains in simple words just why the magic vacuum created by Hoffman Vacuum Valves gives continuous heating comfort and saves fuel.

P. J. SHAW, Sales Representative, Dept. A (Room 303) 126 Federal Street, Boston · Telephone, Liberty 7035-36

Please send me without obligation, your free book "Locking the Door Against the Heat Thief."

Name

Street

City State

One of the Page Advertisements Used in Hoffman Sales Campaign with Partial List of Co-operating Contractors

A. Suits, who acted as spokesman for the company, arose to present the speakers. These included Ralph Emerson, chief engineer; Guy Hutchinson, vice-president and general manager and C. V. Haynes, vice-president and general sales manager. A representative of the *New York Times* was also present and told of the way the newspaper advertising campaign would be handled.

The opening broadside was in the form of a page advertisement, featuring the Hoffman No. 2 vacuum valve. In the first advertisement, there were listed the names and street addresses of every heating and plumbing contractor in the district, who expressed willingness to support the sales drive by placing his order for one dozen Hoffman No. 2 vacuum valves, as packed in the new display containers, and one Hoffman No. 6 quick-vent and vacuum valve.

Mr. Emerson went into details regarding the design and construction of the valve and explained how important it was to include such a device in the ordinary one-pipe steam heating system. Mr. Hutchinson stressed particularly the policy which had long been followed by the company in protecting the jobber in the sale of the company's heating specialties. This policy, he said, would be adhered to in the new drive. Mr. Haynes made a characteristic speech, bringing out the sales features of the drive.

As soon as the speakers had finished, a buffet luncheon was served to the entire gathering.

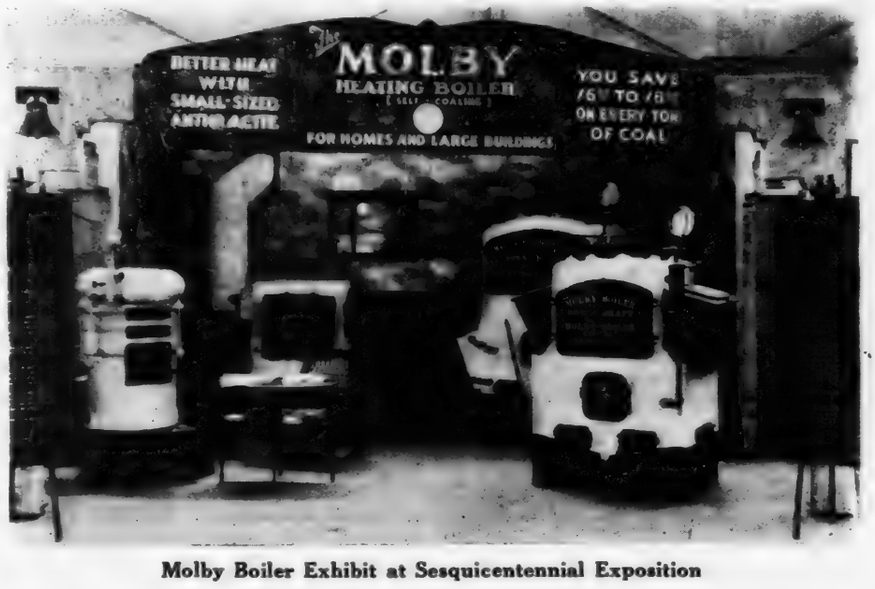
Home-Study Course Now Available in Loose-Leaf Form

We are pleased to announce that we have arranged to have reprinted the instruction papers serving as a basis of the Home-Study Course in Gravity Steam and Water Heating by Asa Marcus Daniels, which has been appearing in THE HEATING AND VENTILATING MAGAZINE. These papers are now available for sale at a price which places them within the reach of all.

The papers are arranged in loose-leaf pamphlet form so as to permit binding in a loose-leaf binder for reference. An advertisement appearing elsewhere in this issue gives full details regarding prices, terms of purchase and subjects covered.

Molby Boilers at Sesqui Exposition

One of the exhibits in the heating section at the Sesquicentennial Exposition, in Philadelphia, is that of the Molby Boiler Co., New York. Three Molby boilers are on display of the magazine-feed, buckwheat-burning type for low-pressure, steam, vapor and water heating. The exhibit is located in the Government Exhibit and Mines Building and one of the three boilers is kept constantly under fire to demonstrate the self-coaling, labor-saving and coal-economy features of these boilers.



Molby Boiler Exhibit at Sesquicentennial Exposition

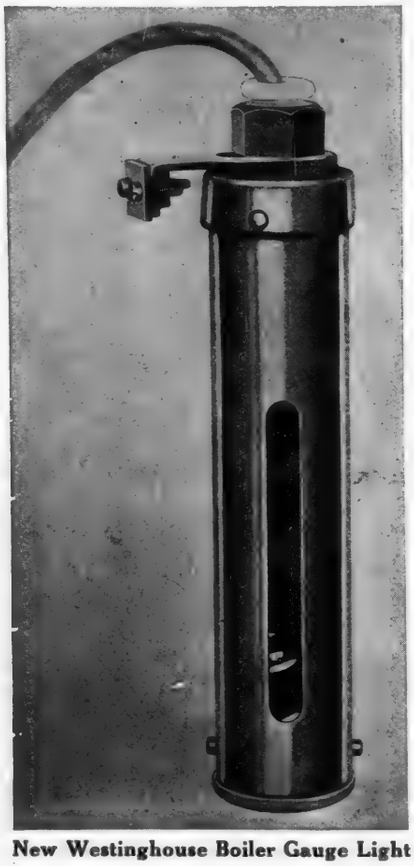
New Apparatus and Appliances

A Boiler Gauge Light That Resists Vibration

A boiler gauge light, consisting of a tubular reflector, with a bayonet attachment to the socket flange, has been designed and is being manufactured by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. A compression spring serves to maintain the connection and to hold the lamp in place, so that neither the reflector nor the lamp can loosen under vibration.

The design of the boiler gauge light permits mounting on the guard rail of any boiler water gauge or on the end of a 1/2-in. conduit used to carry wiring to the reflector. This mounting may be accomplished by the use of a screw driver. When it becomes necessary to change the lamp, no tools are needed to remove the reflector because one turn of the reflector disengages the bayonet attachment, and the lamp can then be screwed out of the standard socket.

The reflector is made of heavy brass tubing with a slot in one side to throw the light on the water gauge only. The reflector is easily adjustable for any desirable mounting height and the mounting brackets are arranged to accommodate a wide range of positioning of the guard rods with relation to the gauge. 48 in. of two-way conductor cord and an attachment plug are furnished regularly with the boiler gauge light. A standard tubular Mazda B lamp with T-10 bulb should be used.



New Westinghouse Boiler Gauge Light

The Reed Visual Dust Comparator

A new and ingenious device, providing a simple means whereby either positive or comparative determinations of the dust content of air may be made, has been developed in the laboratory of the Reed Air Filter Co., Louisville, Ky. This device consists of either one or more celluloid collectors, which may best be described by comparing them with a rectangular top lavatory with excessively large outlet hole. These are pressed from thin celluloid and are about 2 x 3 in. in size. The shape and depth of the depression, as well as the size and location of the air outlet hole, have been carefully worked out by experiment to secure proper contact of the air with the concave surface of the depression.

The principle on which the comparator operates is known as the "adhesive impingement method of dust sampling." It depends on a properly-formed adhesive coated surface upon which the air stream is caused to impinge. To bring this condition about, the depression of the comparator is lightly smeared with white vaseline. One comparator is suspended in front of the air cleaner and the other behind it, and fixed securely with the greased depression facing the air flow.

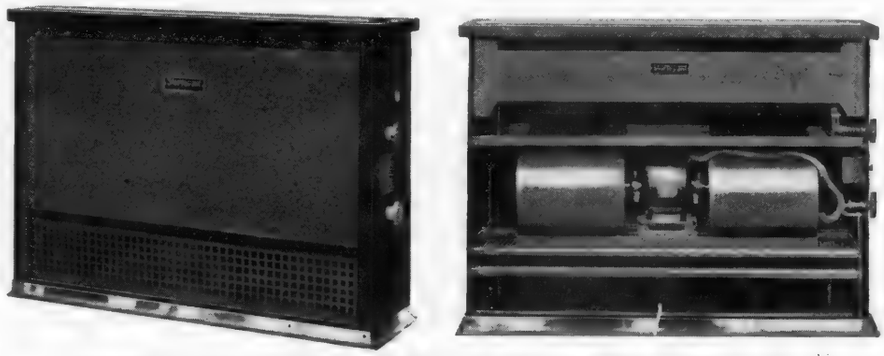
The testing should be allowed to cover about 24 active hours, unless the dust conditions are unusually severe, when less time will be required to produce contrasted results. After the test, the comparators may be kept as permanent records by covering them with glass and binding the edges and sealing the hole in the depression with adhesive tape.

Comparators may be used successfully with all types of air-cleaning equipment and results in all cases are fully reliable for making visual comparison of relative efficiencies. If the comparator exposed behind the air cleaner is dirty, it indicates low cleaning efficiency or faulty installation.

Sturtevant Enters Unit Ventilator and Heater Fields

B. F. Sturtevant Company, Boston, Mass., announces a new line of unit ventilators and unit heaters, the design of which dates back to pre-war days. The advent of the war caused this line of activity to be put aside, and after having been dormant, the designs have been brought up to date, and production started on the units.

One of the major refinements in this ventilator is the method of construction, the entire unit being built up of five sub-units, each complete and independent of the other part. The first of these is the steel cabinet of such design as to make it fit into practically any situation in which it may be required, as it may be finished to harmonize with any scheme of trim, decoration or furnishing. The cabinet proper sets upon a base with an aluminum cove at the floor line, which is mainly designed to prevent the slashing of water from mops, or other cleaning equipment, into the intake, which is close to the floor line.



Exterior and Interior Views of Sturtevant Unit Ventilator Design No. 2

Fan Unit Assembly in Sturtevant Unit Ventilator

Resting on the bottom of the cabinet is the intake damper and recirculation damper, which is another unit part. Its function is to close the inlet opening to the outside air and open the inlet to the room air for recirculation whenever ventilation is not desired and the fans are not running. A grille on the front of the cabinet near the floor line is the means by which air is allowed to re-

Floor Type of Sturtevant Unit Heater Design No. 3 with Recirculating Box

circulate. A single damper controls both recirculating and fresh air inlet. This damper must be air-tight, otherwise, drafts along the floor of a room may result from wind blown through the damper and through the recirculating grille.

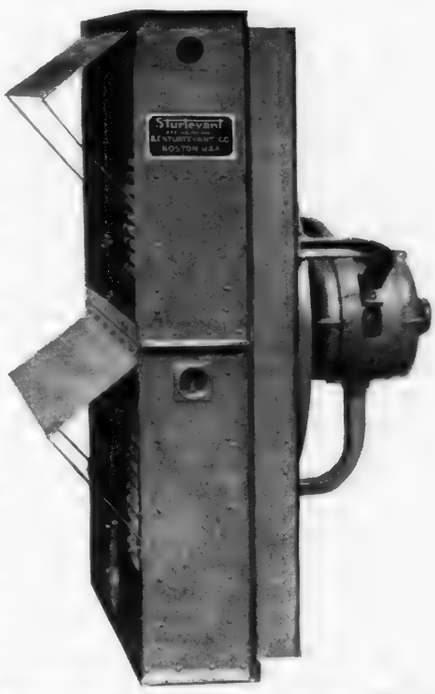
Air filters are supported within the intake damper frame and are easily removable for cleaning. They are of the adhesive type and are made by one of the best-known manufacturers of air filters.

A fractional horse power motor with multivane fans at either end is mounted upon a base which rests upon the intake damper frame. This element is supported on a spring base absorbing vibration.

The fourth unit consists of the dampers for controlling the temperature of the discharged air. These dampers balance the amount of air which flows through the radiator and by-pass, so that the desired room temperature may be maintained. They are patterned after dampers which have been used by Sturtevant for many years in connection with various systems of air conductors and conveyors.

The radiator is the fifth unit part. It is of the extended surface type, the prime surface is brass, the extended surface is copper. Altogether, the Sturtevant unit ventilator marks a high standard of design and construction. Full technical and other details of this ventilator are contained in catalog No. 344, just from the press of the B. F. Sturtevant Company, Boston, Mass.

The Sturtevant Company is also at this time sending out catalog No. 339, describing the unit heater, design 3,



Sturtevant Unit Heater Design No. 3 Built in Sizes of 5000 and 8000 C.F.M.

Sturtevant Unit Heater Design No. 3 with Capacity of 2000 C.F.M.

having capacities of 2000, 5000 and 8000 cu. ft. per minute. This unit is of the conventional overhead type, with Sturtevant propeller fan, either motor or turbine driven, with a heating element of the extended surface type, consisting of tube made of seamless copper, over which is wound a helix of thin brass ribbon.

A New Electric Flow Meter

The necessity for providing graphic records of the flow of water or other fluids used throughout the industries has brought about some very interesting developments in meter design. One of the latest examples of a meter embodying accuracy of measurement and ability to locate the recording device at

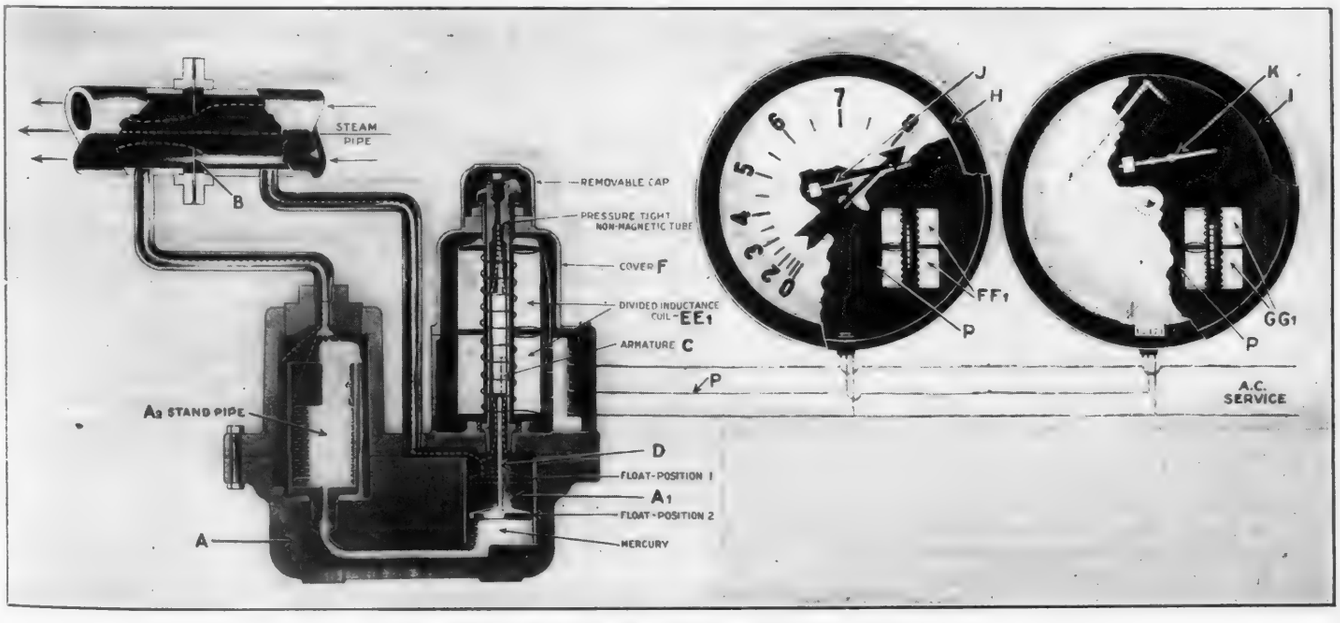


Diagram of the New Brown Electric Flow Meter

a distance from the meter proper, is announced by The Brown Instrument Company, Philadelphia.

Electricity is, of course, the ideal medium for such an instrument, since it affords a means of producing external indications and records of conditions existing inside of a steam or water pipe, without transmission of mechanical motion.

As shown in Fig. 1, manometer A operates in response to differential pressure caused by flow of the fluid through an orifice B. When the rate of flow increases, mercury is depressed in chamber A_1 and rises in chamber A_2, the difference in mercury level in the two chambers being a measure of the rate of fluid flow through the orifice in accordance with well-known principles. When the flow increases from zero to a maximum value, a float which rides on the mercury surface in chamber A_1 is lowered from the position indicated by dotted lines to a lower position as indicated by the solid lines. The float is made of non-corrosive metal and chamber A_1 has a moulded bakelite lining, ribbed on the inside, insuring freedom of action at all times. An armature C of transformer iron is supported by the float on a non-magnetic rod D and the armature is raised and lowered in accordance with the motion of the float.

This armature travels inside of a rust-proof, non-magnetic tube which has high electrical resistance and great mechanical strength. The pressure of the fluid being metered is confined within this tube and the electrical inductive winding EE_1 which is slipped over the outside of the tube has excellent magnetic linkage with the armature which moves inside. At the same time, the coil is under atmospheric conditions only and is protected by a cover F.

The outer ends of the divided winding EE_1 are connected directly across the service mains of an alternating current supply line and connections are run from these ends directly to the outer ends of a similar divided inductance coil FF_1 which operates an indicator H and also to divided inductance coil GG_1 operating a recording instrument 1. Armatures are hung on counterbalanced arms J and K in the two instruments. The points of connection between the two parts of divided coils EE_1, FF_1, and GG_1 are all connected together by a neutral wire P and when thus connected the coils form the self adjusting inductance bridge which is the outstanding basic feature of this flow meter.

When the armature in the manometer is raised or lowered by a change in fluid flow, the relation between the voltages across the two parts E and E_1 of the winding will be changed. This causes the currents in the two parts FF_1 of the indicator coil, and also the currents in the two parts GG_1 of the recorder coil, to become unequal. As a result the armatures of the indicator and recorder move to new positions corresponding to the position of the armature C and the meter readings are adjusted accordingly by means of the gearing or linkage shown.

In order to make use of the simple inductance bridge method of operation, a special type of integrator was developed which increases the counter readings in proportion to the square root of the angular deflection of the recorder pen arm, this being the relation of flow to the pressure difference across the orifice. The parts are simple and can be made accurately under practical manufacturing conditions so that the square root relation is always reproduced correctly by the mechanism; and, second, such a simple integrating mechanism which reproduces the square root relation permits the employment of the inductance bridge method of transmitting the meter readings.

The Doherty Gas-Oil Burner

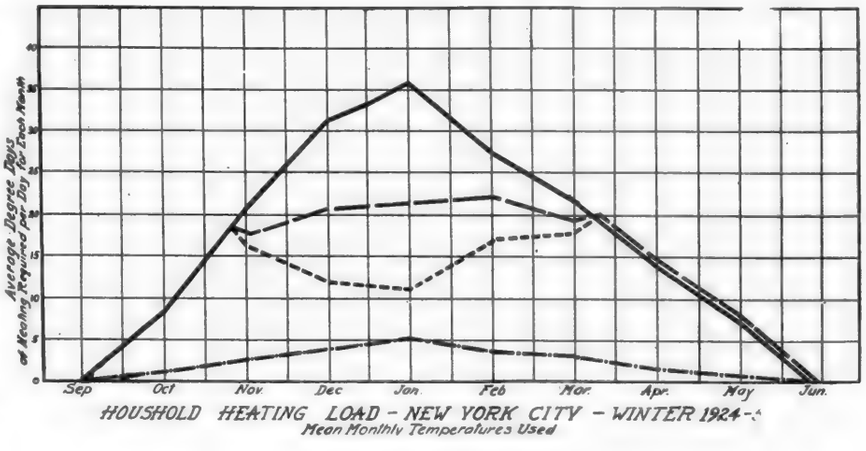
Considerable interest at the convention exhibit of the American Gas Association in Atlantic City, October 11-15, centered in the display of the Doherty gas-oil burner, which was first demonstrated at last year's exhibit. The news that this design was under development first appeared in THE HEATING AND VENTILATING MAGAZINE for May, 1925. The purpose of the design was to develop a burner capable of burning the heavier grades of oil and at the same time of a type which could be switched instantaneously to gas. The burner, as displayed at this year's exhibit, was of a remodeled type.

During the coming winter, over 50 of these gas-oil burners will be used for experimental purposes in as many installations, to substantiate the mechanics, operating characteristics and efficiencies of the machine and, at the same time, to disclose any inherent weaknesses that may appear. It is hoped that the Doherty gas-oil burner can be offered as a commercial product in the early spring of next year. In that case, a general program of commercialization will be put into effect.

As was explained when the first model appeared, the combination of a gas and oil burner is intended to meet the problem of an excessive winter load which has been facing the industry in case house heating were generally adopted. With this burner, it would be possible to burn gas during the milder periods and to switch on to oil during the severe winter weather, when otherwise the gas load would be too high.

In connection with the display, a chart was presented showing characteristic house-heating load curves of straight gas house heating in the vicinity of New York, during the winter of 1924-25. On the same chart was drawn a curve showing the characteristic load using a 250-sq. ft. gas-oil burning unit, in which oil was used automatically to supplement the supply of gas at a certain predetermined temperature, through the means of an outside thermostat. In this particular case, a house was assumed of 450 sq. ft. of steam radiation. Gas was used to the extent of 50% of the demand and this rate of supply was supplemented with oil for the balance of the demand, when the outside temperature reached approximately 35° F.

A dotted black line, falling considerably below the gas heating curve and the characteristic load curve, represented the load curve obtained in operating the gas-oil burner in a modified form, where the bulk of the gas supply is automatically cut off, when it becomes cold enough for the oil burner to function.



Second Doherty Gas-Oil Burner Chart

In another chart an even clearer presentation is given of the extent to which the gas-oil burner can be utilized to improve the load characteristics of house-heating. In this chart, mean monthly temperatures are used. The solid black line represents the load curve for straight gas househeating. The broken line represents the gas load curve using the 250 sq. ft. gas-oil burner where oil is used to supplement gas. The dotted curve gives the characteristic load using the 250 sq. ft. gas-oil burner where oil is used primarily to displace gas, the bulk of the gas being automatically cut off the line when the weather is cold enough for the oil burner to operate. The dot and dash line indicates the characteristic load curve using the 50 sq. ft. burner unit where the use of gas

represents 10% to 15% of the total load. The broken line above indicates how the undesirable peak of househeating can be eliminated and the extent to which the load factor can be improved.

In this particular case, using an amount of gas representing 50% of the demand, the total seasonal consumption of gas amounts to 76.5% of the total fuel consumption. The seasonal load factor is 41% in comparison with a load factor of straight gas househeating of 27%, or an increase in load factor on a percentage basis of 53%.

The gas-oil burner can be utilized so that the amount of gas used represents from 30% to 70% of the total demand. With a 30% gas demand, the gas consumption will represent approximately 50% of the total fuel consumption for the season and the load factor will be increased to approximately 60%. With a 70% gas demand, it is pointed out the gas companies can obtain 90% of the business with a load factor of approximately 35%.

The adjustment of the gas-oil burner is sufficiently flexible, it is added, to produce those characteristics of gas househeating which would prove helpful to the majority of gas companies regardless of local conditions involved.

Gypsum as an Insulator

In view of the increasing use of gypsum for insulation and building purposes, the address made by H. J. Schweim, chief engineer of The Gypsum Industries, before the Ohio Building Supply Dealers, contained many points of interest to heating men.

After telling how gypsum is mined, powdered and then calcined, Mr. Schweim told of the forms in which it was produced, namely, fireproof sheathing board, gypsum concrete and cellular gypsum.

Cellular gypsum, he explained, is for use in exterior walls between the studs and in attic ceilings between the joists as an insulating medium, and being a mineral insulator it is not subject to disintegration. At present there are four different weights of this material—twelve, eighteen, twenty-four, and thirty pounds per cubic foot, the lighter weight materials being used between the studs or joists where they are not subjected to any loads or stresses, while the heavier materials are used as floor fill between wood sleepers or as a base underneath cement finished floors, or as drainage fill and insulation on a roof.

More and more houses are being insulated each year, said Mr. Schweim, so that it is only a question of time when it is going to be next to impossible to sell an uninsulated house. Figures have been furnished which show that the extra cost of properly insulating a house with gypsum has been offset by the smaller size of boiler and lesser amount of radiation required.

Death of Charles O. Lyon

Charles Ollard Lyon, president of the Charles O. Lyon Company and its subsidiary, the Thatcher Company, formerly Thatcher Furnace Company, Newark, N. J., and the Standard Boiler and Radiator Company of Garwood, N. J., died at his home in Norfolk, Conn., September 25. During the past two years, Mr. Lyon had retired from the active direction of his company and had settled on his estate in Norwalk, Conn., where he became greatly interested in agricultural developments. He continued, however, to direct the policies of the various companies which he had established and developed through a steady growth to their present position. He leaves a

The Late Charles O. Lyon

strong impress of his personality on those who were associated with him.

Mr. Lyon was a native of Greenwich, Conn. His ancestors were among the oldest families in Fairfield County, having settled there more than 250 years ago. He was the son of Captain William L. and Katherine Mead Lyon and is survived by his wife, Ida P. Lyon, a daughter, Elinor L. P. Lyon, and a son, James Poillon Lyon.

After his marriage, Mr. Lyon moved to Short Hills, N. J., and became identified with the progress of the town, having served for many years as chairman and charter member of the township committee. He was largely instrumental in promoting the first trunk line sewer embracing Summit, Milburn, South Orange, East Orange, Irvington and parts of Newark and Elizabeth. During the time he resided in Short Hills, he was vice-president of the Ironbound Trust Company of Newark, N. J.

Mr. Lyon was a member of the Shore Haven and the Westport Golf Club, also of the National Republican Club of New York. He was a director of the People's Bank & Trust Company of Westfield, N. J.

In attendance at the funeral services, which were held September 28, at Christ Church, Greenwich, Conn., were almost 300 employees of the manufacturing establishments of which Mr. Lyon had been the leader, presenting a visible expression of the esteem and high regard in which Mr. Lyon was held by those who served under him.

Death of Foster W. Lamb

A figure long prominent in the heating industry in the Middle West passed on when Foster W. Lamb, president and founder of F. W. Lamb Co., 24 East Kinzie St., Chicago, died at his home in Oak Park, Ill., October 10. Mr. Lamb was 72 years old. He had been in the heating and ventilating business in Chicago ever since 1882, coming to that city from Buffalo, where he was born. Mr. Lamb was formerly president of the Chicago Master Steamfitters Association and had served the National Association of Master Steam and Hot Water Fitters, now the Heating and Piping Contractors National Association, as treasurer. At the time of his death, he was treasurer of the Chicago Master Steamfitters Association.

Mr. Lamb was looked upon as one of the old guard of the industry and a representative, in many respects, of the highest type of heating and ventilating contractor. He is survived by a widow and two sons.

PLUMBING AND SANITARY ENGINEERING DIRECTORY OF ST. LOUIS TECHNICAL INSTITUTE, St. Louis, Mo., is a pamphlet published as a supplement to the regular school directory. It gives in detail a description of the studies pursued in seven different "Korses" as they are termed. While mainly devoted to plumbing, there are two "Korses" of interest to heating men, one comprising the subjects of heating and ventilating, and the other, the subjects of special hot water, steam and vapor heating.

REFERENCE DATA ON EXPANSION IN PIPE LINES AND THE APPLICATION OF ADSCO EXPANSION DEVICES appears on the cover of an elaborate bulletin No. 201, issued by American District Steam Co., North Tonawanda, N. Y. This publication, as the title implies, deals with the subject of pipe expansion and supplies a quick and convenient method for engineers and users of pipe lines to compute the amount of expansion, due to varying temperatures. It also presents a complete line of expansion devices, developed and manufactured by American District Steam Company. The catalog contains a wealth of technical information and is well illustrated with photographs and drawings of the equipment discussed, together with dimensional information. Size 8½ x 11 in. Pp. 32.

New Trade Publications

GOETZE GASKET GUIDE is the title of a very complete and comprehensive catalog issued by Goetze Gasket & Packing Co., New Brunswick, N. J. This company has developed the making of gaskets for various purposes to a high point and offers gaskets for almost every conceivable preference and up to almost incredible sizes. One picture in the catalog shows a shipment of 600 8-ft. gaskets. Among the many types of gaskets illustrated and described in the catalog are those for use in boiler works, bonnet gaskets, corrugated gaskets, both plain and asbestos-lined, cylinder, economizer and manhole gaskets and French type gaskets. In addition to this, the company manufactures flexible metallic packing, braided asbestos packing and valve discs. The catalog is complete in text and illustrations, as well as dimensional data. Size, 6 x 9 in. Pp. 46.

INSULATION—HOME CONSTRUCTION WITH INSULEX is an interesting piece of literature put out by the Universal Gypsum Company, Chicago, describing in a very complete way, with photographs and drawings, the methods in which Insulex may be used to insulate the home. Various chapters are devoted to the insulation of floors, walls and ceilings; there are a number of illustrations of homes in which Insulex has been used; a report on the heat conductivity of Insulex by Professor G. F. Gebhardt, and a page of temperature records secured on Tycos recording thermometers, showing the uniform indoor temperature maintained in Insulexed houses, with wide ranges of outdoor temperatures. Size, 8½ x 11 in. Pp. 16.

HOW'S THIS FOR COMPRESSED CAPACITY? appears at the top of a circular being mailed by Aerofin Corp., Newark, N. J., designed to bring to the attention of the reader the transferability of the Aerofin tubing. The text of the circular cites the advantages of this form of transfer service over the conventional cast-iron type.

THE MOVING POINTER is the caption of a circular distributed by the Foxboro Co., Inc., Foxboro, Mass., describing the dial draft gauges manufactured by this company. These indicating draft gauges are made in single, duplex and triple types, indicating draft measurements at one point or at two or three points simultaneously.

THE ELECTRICALLY HEATED HOME, booming electric heating for residences and quoting many advantages derived from the use of electricity for heating purposes is the title of a booklet issued by the Electric Heating & Mfg. Co., Seattle, Wash.

KING COAL AUTOMATIC MECHANICAL STOKER is described in a catalog issued by Joseph Harrington Co., Harvey, Ill. This equipment was particularly designed for the burning of screenings and other low-cost coal under small boilers, ranging from 40 to 250 H.P. The stoker is made in standard sizes of 3, 4, 5, 6 and 7 ft. width and with 6 and 8 ft. length. The King Coal automatic stoker is a front, over-feed, stepped grate mechanism, having two stationary and two movable grate sections. The feed hopper and the feed plate are indicated in Fig. 2 by the numeral "1." This feed plate is a combination section, forming the bottom of the coal hopper as well as the first of the four grate sections. The rear end of these grate bars rests and slides upon the stationary grate "2." In turn the second grate section rests upon grate "3." The third grate section, being movable, rests and slides upon "4" at the same time sliding back and forth under section "2."

The movable steps, or grates, have a reciprocating action which causes the coal in the hopper to work along to the ash plate. This backward and forward, reciprocating motion on the part of steps "1" and "3" affords a uniform feed at all times. It also provides a certain disturbance for the coal (as it drops from step to step and is shoved along by pressure from behind) so that caking is impossible, the fire bed is thoroughly aerated, and all the combustible elements are consumed. However, this action is not sufficient to produce clinkering.

After the fuel has traveled from the hopper to the rear of grate "4," it falls as ash to the ash plate "5." This plate also has a slow, steady, reciprocating action. Here the hot ash is delayed until it has given off its surplus heat, when it travels forward again along the ash plate to the ash pit.

To provide control, the movement of the grates is adjustable (from 1 to 4 inches). The whole mechanism operates from a ½ H.P. motor, and there are only three moving parts.

The catalog shows many excellent photographs of installations and such statistical and other information as will give the reader a good idea of this method of handling low cost coal. Size 8½ x 11 in. Pp. 16.

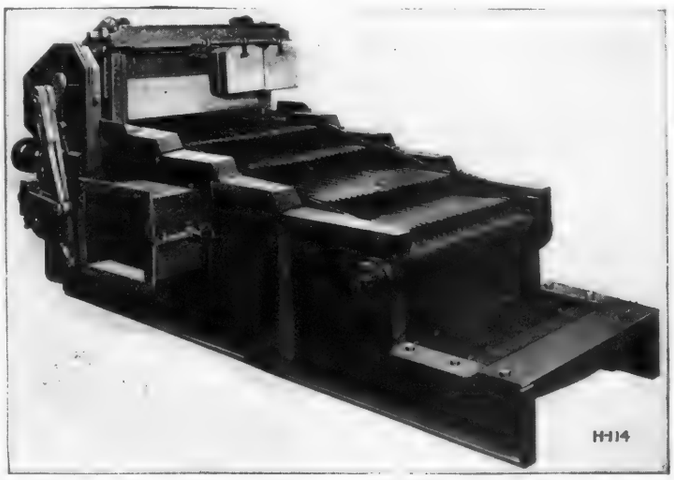


Fig. 1. Rear View of King Coal Automatic Mechanical Stoker

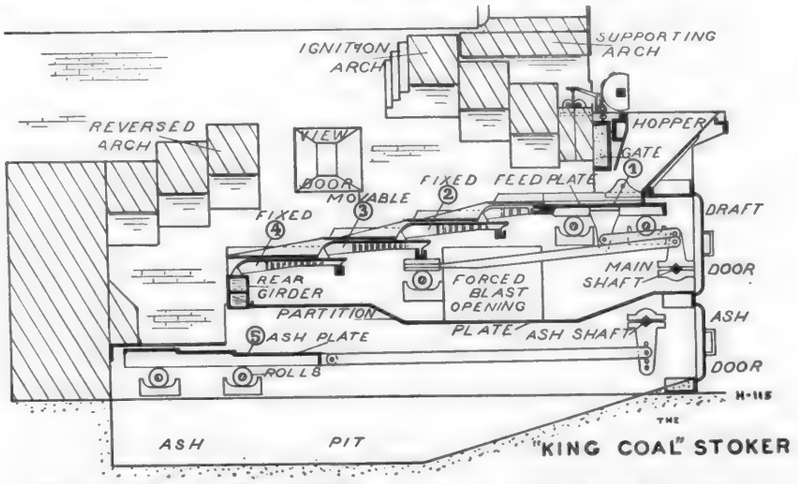
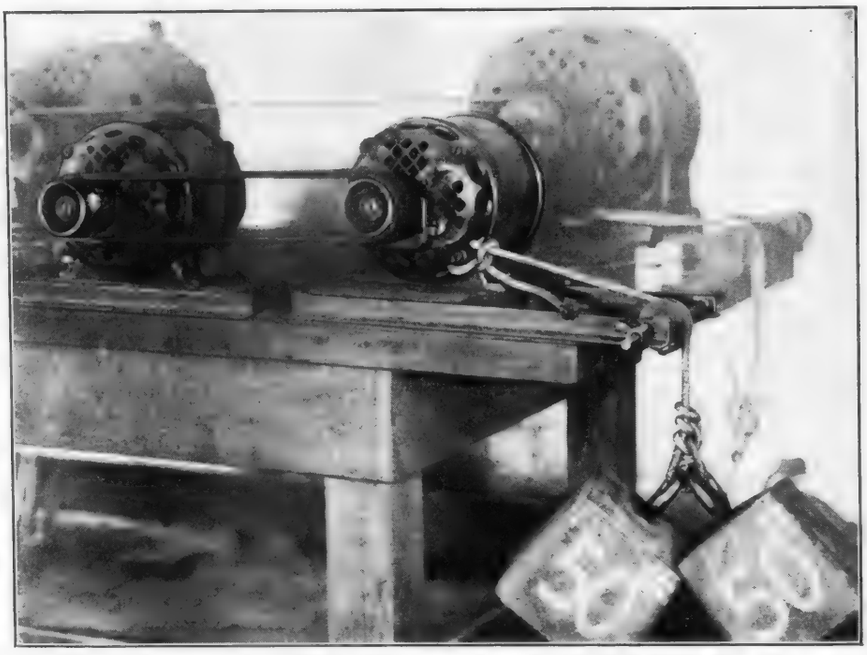


Fig. 2. Construction of King Coal Automatic Mechanical Stoker

THE OPERATOR'S STABILIZER appears on the front page of Volume 1, No. 1, of a house organ started by the Lincoln Electric Co., Cleveland, Ohio, manufacturer of motors and arc-welding apparatus. The first issue is filled from cover to cover with questions and answers on the electric welding problem and as it is designed for circulation among electric-welding operators, it should fill a very real demand. It is published under the direction of A. F. Davis, vice-president of the company, who proposes, according to an editorial note on the last page, that it shall be "published as often as you fellows send in the stuff."

THERE IS A DIFFERENCE THAT MAKES THEM "KEEP-A-RUNNING" is the caption of a folder being mailed by Century Electric Co., St. Louis, calling attention to the details of construction of the motors manufactured by this company. The folder contains photograph and data of a test in which a ¼-H.P. motor drove a second ¼-H.P. motor continuously, except for minor power interruptions, for approximately two years, with



Century Electric Motors Undergoing Bearing and Shaft Test

about 2½ times normal bearing pressure, with no trace of wear on shaft or bearings. This is equivalent to practically ten years of average oil-burning service. The point of this test illustrates the satisfactory operation of the Century system of bearings and lubrication. It is interesting to note that during the entire run, both motors operated on the normal amount of oil held in the bearing systems. Not a drop of oil was added after the test once started.

THE DUNHAM MAGAZINE for September, issued by the C. A. Dunham Co., Chicago, contains, naturally, many items of interest only to members of the Dunham organization, but the table of contents also includes several articles that might be read with profit by anyone interested in general heating problems. There might be mentioned "Vapor Heating," a well-expressed story of this method of heating; "The Heating of Swimming Pools," an article containing interesting data on this specialized problem; "Insulating the Boiler of a House Heating System with Insulating Cement," and a technical article on the chemistry of boiler water treatment, involving water softening, the treatment of boiler water, cold water softening and hot water softening.

REVOLUTIONIZING THE STEAM FLOW METER is the title of a folder just received from the Brown Instrument Co., Philadelphia, Pa. This announces a flow meter of new principle and new design, built by industrial instrument manufacturers of 65 years' standing. By the application of a new principle, this meter is inherently independent of fluctuations in line voltage; all electrical parts and connections are entirely outside the pressure chamber; only three connections required to be made at time of installation; equipped with an indicator that can be read directly with the same facility as an automobile mileage indicator is read. The meter is built in several forms and may be had as a single or double-scale meter, as a recorder, as a combined indicator, recorder and integrator and as a continuous strip chart recorder, either single or multiple.

AEROFIN COMPACT RADIATION is the title of a circular issued by Aerofin Corp., Newark, N. J., emphasizing this transfer equipment. An interesting feature of this equipment is indicated in the statement accompanying a picture that, "This 5-ft. 3-row Aerofin unit contains 265 sq. ft. of radiating surface, occupies only 11½ cu. ft. of space and weighs 195 lbs. complete."

Workman Carrying Aerofin Unit of 265 Sq. Ft.

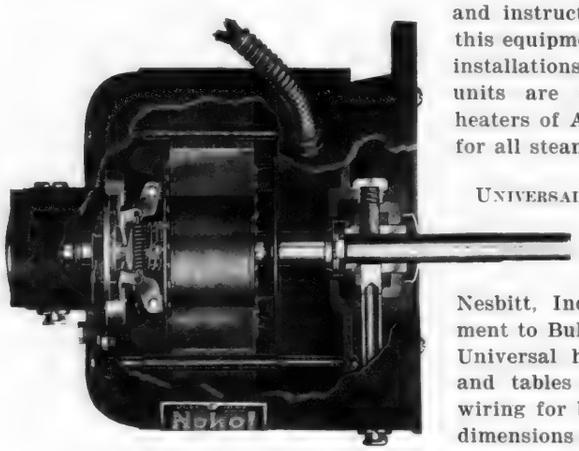
A second circular, entitled, "Comparing the Hare to the Tortoises," emphasizes the high heat conductivity secured through the use of copper and brass.

A GOOD STORY IS INSIDE appears on the otherwise blank cover of a folder issued by Drying Systems, Inc., Chicago, on the inside pages of which appears a list under the caption, "The Best Story Ever Told is Satisfied Users." The list includes some 50 users of Phoenix constant-effect air filters and of National rotary air filters. With this circular, cards are being sent announcing that the Euclid Avenue Baptist Church, Cleveland, has just been equipped with National rotary air filters, having a capacity of nearly 100,000 cu. ft. per minute and that recent projects from the office of Smith, Hinchman and Grylls, architects and engineers of Detroit, Phoenix constant-effect air filters have been installed aggregating over 400,000 cu. ft. per minute capacity.

E-Z DAMPER GRIP-TITE FLOOR VENT is featured in a new circular issued by the Aeolus Dickinson Co., Chicago, Ill. This type of floor vent is of mushroom style, but is distinctive in having a damper located practically at the floor and adjustable by a bolt passing through the top. It is stated that this method of air control obviates, to a great extent, objectionable drafts. The Grip-Tite feature consists of spring steel strips extending down into the concrete, with points spreading outward and so arranged that if the metal floor sleeve is withdrawn, these points are forced out into the concrete and thus secure a firm anchorage to hold the mushroom in place.

THE JANETTE MOTOR is the title of a folder being sent out by the Janette Mfg. Co., Chicago, describing in particular the type of motor developed for use with domestic oil burners. The

folder contains interesting details telling of the development of this motor through the last six years to a point where it is now used on many of the recognized standard oil burners. After having first used fixed ball bearings, the design was changed to adjustable ball bearings, which were furnished for two years, at the end of which time, the company initiated research work into the particular bearing problem where the motors were used for oil burners, ultimately developing a sleeve-type bronze bearing, so arranged as to be self-aligning and self-lubricating. Another interesting feature of design in connection with the shaft is the provision for easily removing the rotor from the shaft, permitting the replacement of the latter without throwing away the whole rotor assembly. Special attention is given to the windings, as these are subjected to severe usage in



Janette Oil-Burner Motor

operating through a period of half a year and then standing without use for the same length of time in basements that are frequently damp.

GAS-ERA GAS-FIRED BOILERS are described in a circular issued by L. J. Mueller Furnace Co., Milwaukee, Wis. This is a rectangular sectional cast-iron boiler, built in sizes with capacities from 400 to 12,000 sq. ft. of steam radiation. It is constructed with a 38-in. water line and requires headroom of not over 5 ft. The boilers consist of right-hand and left-hand end sections, with alternate burner sections and intermediate sections between. The sections are surface-ground, so that when drawn together, they are gas and air-tight. Streamline burner tubes, with single staggered rows of ports, permit secondary air to be uniformly distributed to the base of each flame. Primary air is admitted through a venturi mixing tube. Each burner is located in its individual combustion chamber, complete water-backed and provided with individual flues. The boiler is thus a multiple unit installation and may be enlarged from time to time, as desired. The control of the burner is automatic, the main burner control valve being magnetically operated and closes in the event of current failure. The boilers are rated in accordance with the A. G. A. requirements and standards.

DOUBLE CONTROL PANELS, a new line designed to govern motors driving house, sprinkler, sump and circulating pumps in hotels, office buildings, large apartment houses and similar buildings are announced by the General Electric Co., Schenectady, N. Y. This new line of panels covers both alternating and direct current, the direct current type bearing the designation CR-4771 and CR-4772, while the alternating current type will be known as CR-7771 and CR-7772.

INDUSTRIAL HEATING WITH BUFFALO UNIT HEATERS is the title of a new booklet known as Catalog No. 466, issued by the Buffalo Forge Co., Buffalo, N. Y., and giving dimensions, sizes, capacities and instructions for the installation of this equipment. Several views of actual installations are also included. The units are made up with Breezo-Fin heaters of Aerofin type and are suitable for all steam pressures up to 50 lbs.

UNIVERSAL HEATING AND VENTILATING UNIT is the title of Bulletin 207 (A.I.A. File No. 30-D-11), issued by John J. Nesbitt, Inc., New York, as a supplement to Bulletin 205. Motors used with Universal heating units are described, and tables given of current required, wiring for branch circuits, approximate dimensions of panelboards, wire conduit sizes along with a list of typical electric specifications. Size 8½ x 11. Pp. 12.

YEAR BOOK OF THE MERCHANTS ASSOCIATION OF NEW YORK FOR 1926 is off the press and contains a resume of the activities of the association for the past year, also alphabetical lists of the approximately 7000 members, with details concerning same.

Steam Well at Healdsburg Geyser, Sonoma County, California

Steam Wells in California

In the accompanying photographs are shown different views of the steam well which has been drilled at the Healdsburg Geyser in Sonoma County, Cal. As will be seen, steam is given off at a very high pressure and at a high temperature. Although this steam eventually is to be used in driving electric generators, some of it is now being applied to heat buildings at the resort near the wells.

A total of seven wells has already been completed in the Sonoma County district.

Close-up of Healdsburg Geyser Steam Well, Showing How Steam Has Been Harnessed

Movement in Chicago to Promote Sale of Coal

AN interesting development in the competition between coal and other fuels is indicated in the organization of the Chicago Fuel Service and Research Institute under W. L. Brainbridge, director. The institute is located at 343 South Dearborn Street, Chicago.

According to the constitution and by-laws adopted June 22, 1926, the objects of this organization are to furnish facts and information of all kinds in regard to the use of coal as a fuel, the best methods of burning, types and sizes of heating apparatus, inspection of heating apparatus, to answer inquiries relating to this subject, to confer with architects, home owners and builders in regard to coal storage, heating and proper ventilation, to co-operate and assist distributors of fuel, to co-operate with the manufacturers to produce superior types of heating apparatus, to be a clearing house of heating, fuel and combustion ideas, and to co-operate in investigations and reports to technical staffs of institutions upon the value and availability of all devices through, or by which, coal may be used more economically.

Membership is limited to any party or organization producing or selling coal in the city of Chicago and the adjacent suburbs within Cook County, Illinois.

HOUSE-HEATING PLANTS INSPECTED AT NOMINAL COST

One of the chief features in this scheme and one which will appeal greatly to the general public is the inspection of house-heating plants for the very nominal sum of $5.00. Larger plants will carry a slightly heavier charge, but for this very low fee, it is the idea to have a proper inspection made of any coal-burning apparatus which is not giving satisfaction and to report on the necessary alterations to be made in order satisfactorily to rectify the trouble.

Another matter to receive particular attention is the repair and replacement of old or obsolete furnaces and boilers, so that these can be put into permanently good condition, instead of being patched up by some local shop, as now is so often the case.

The organization is to raise no revenue other than that required to pay legitimate expenses over and above the amounts received from inspections, reports, etc. Advance payment of dues to the extent of $100.00 is made by each member on election and any further assessment as it becomes necessary is to be based on the volume of coal sold by the member in comparison to the total volume sold by all members within the territory covered.

The basic object back of the whole proposition is to protect the consumer against unnecessary expense in the burning of coal, which means, in turn, proper instruction in stoking, proper fuel best suited for the apparatus and the maintenance of the apparatus in as efficient and satisfactory condition as possible.

It would seem that the placing of such dependable and expert advice in reach of every resident of Chicago at the economical and attractive fee charged should alone be a great boon to the average citizen.

Half a Million to Boost Anthracite

In an address by Daniel T. Pierce, vice-president of the Coal Operators Conference, delivered before the conference September 3, 1926, and appearing in the September *Retail Coalman*, it is stated that the coal operators are spending half a million dollars on the Anthracite Coal Service, with the expectation that for every dollar they spend, the retailers will spend two. A thorough-going advertising and merchandising policy is advocated and a frank acknowledgment of competition from the gas-burning and oil-burning sources is made.

The address calls attention to the Central New Jersey Coal Exchange at Elizabeth, N. J., which has already made an arrangement with a firm of engineers to survey and investigate any heating problem, however small, at a charge of $3.50 to the consumer. There are now five men, mostly employed on household installations, who are as busy as they can be on this work.

Mr. Pierce asks why, when people came to see the model house being exhibited by Hiram Blauvelt (vice-president of the Comfort Coal-Lumber Co., Inc., of Hackensack, N. J.), they expected to see an oil burner in the cellar. Such visitors asked why it was not so equipped if it was a model house. He answers his own question by saying that the people assumed that the oil burner naturally would be used because day after day and month after month, the oil burner interests, through advertising, have been telling the public that the oil burner is the most up-to-date thing, the most convenient thing and the most satisfactory method of house heating.

The operators see only one way to meet such a situation and that is by telling the story of anthracite in a similar manner, by telling it repeatedly, year after year. Otherwise, the operators realize that they are going to lose a few tons here, a few tons there, which, in the aggregate, are going to constitute the difference between a growing business and a diminishing business.

The paper closes with a suggestion for the operators and dealers to hang together and to do a great many things that they have never done before, in order to keep the coal business expanding in proportion with what should be the normal increase in the business.

At the same conference the coal situation was discussed in a very frank and open manner and various speakers went into the details of the present difficulties, handling the subject without gloves. One of the most interesting addresses was that made by Hiram Blauvelt, vice-president of the Comfort Coal-Lumber Co., Inc., of Hackensack, N. J.

BETTER COAL SELLING METHODS NEEDED

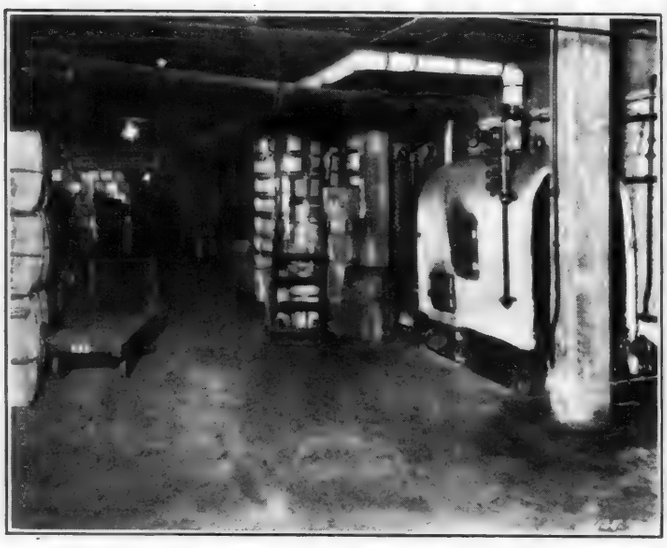
Mr. Blauvelt stated that to-day the oil burner is a stark reality and a prominent factor in the future of the domestic heating field. Another factor he mentioned is the numerous periodic strikes in the coal fields which have shut off consumers from time to time, regardless of inconvenience, and have caused much criticism and ill-will on the part of the general public. Since the World War, it has not been necessary to sell coal, as the demand has usually exceeded the supply, and the coal-selling organizations naturally have let down, so that the market is just riding along, while the selling, production, sales and distribution structure has simply rusted.

Further on in the address, he pointed out that while enormous advances have been made in all sorts of electrical devices and house-comfort apparatus, no one has ever spent much time with the old furnace down in the cellar. In many cases, practically the same equipment has been in use for the past 20 to 30 years. Improvements in coal-burning apparatus are foreseen, such as the larger introduction of the magazine idea for coal feeding, thermostatic regulation and automatic removal of ashes.

The use of coal, Mr. Blauvelt said, is the cheapest, or at least the most economical method of heating, and he declared that most of the customers who have gone in for oil burning, which he has checked up, are paying about 100% more than for coal, when all factors are considered. Improvements in the efficiency of coal-burning apparatus, it is felt, would bring coal even farther on the economical side.

Mr. Blauvelt went on to state that considerable back-fire may be expected on oil burners during the next two years, owing to many having been sold by ignorant or untrained salesmen, who claimed advantages for them that can never be attained. This unintentional deception, declared the speaker, while hard on the oil-burner interests, is likely to have the effect of causing the public to return to coal. Mr. Blauvelt considered that it would have been a better thing for oil burners if they had not had the coal strike to push them onto the market prematurely.

Interesting figures on oil production were given. In 1926, for the first time in 10 years, stated Mr. Blauvelt, consumption of oil will exceed production



How Oil-Burner Installation in Chicago Warehouse Permitted Former Coal Bin to Be Utilized for Storing Fruit

In This Department Store the Cleanliness of Oil Burning Permitted the Display of White Enamel Furniture Near Boiler

and, with the presumable increase in demand in the course of two or three years, we will be importing 300,000,000 bbls. of oil per annum, which, he declared, is not in sight. All signs, he added, seem to point toward a higher-priced oil of a poorer quality in the very near future. Expectations of burner oil going to 12c per gallon this year are also held out.

Gas heating was then taken up. According to Mr. Blauvelt, competition from gas need not be taken very seriously at the present time, owing to the difficulty the gas companies experience in accommodating themselves to the excessive winter heating load and the reduced summer load. The address closed with a quotation, in which we quite concur, viz:

"Unless a man advertises his business, the sheriff will."

Use of Oil Increases Business Facilities

One of the talking points that has crept into oil-burner literature has been the claim that, through the use of oil for fuel, it has been possible to utilize a large portion of the basement of the home that would otherwise be devoted to storage of coal, or in other ways be unfit for use.

Two interesting photographs demonstrate the application of this idea by small mercantile establishments using the domestic type of oil burner. In one case, a fruit warehouse in Chicago, with a load of 1500 sq. ft. of steam radiation, found that it was possible to utilize what had previously been a coal bin of considerable size for the storage of some of the products handled.

In another case, a department store turned its former coal bin and space that would have been too dirty to use when burning coal, into a retail furniture department. The cleanliness of the oil-fired plant makes it possible to handle white enamel furniture in the basement.

It is obvious that the value of the increased space so made available, in cases like these, might easily equal, in a few weeks, the cost of the entire oil-burner installation.

New Electric Steam Radiator

A new electric steam radiator, patterned somewhat on the idea of the gas-steam radiator, has been placed on the market by the Electric Steam Radiator Co., 744 Harrison St., San Francisco, Cal. The steam in this radiator is generated in the radiator itself by an electric element inside the radiator. This element is thermostatically controlled so as to keep the radiator at the proper temperature and the element itself consists of nicrome wire embedded in a finely-ground chemical powder, which is converted into a solid mass of high density through a special process. When so treated, this powder becomes a good conductor of heat and allows the heat from the element to transmit rapidly into the water while maintaining the heating element in a high state of efficiency protected from the action of both air and water.

COOL BREEZES FOR HOT WEATHER PROFITS is the title of an attractive piece of literature recently received from Arctic Nu-Air Corp., Chicago, and featuring a system of air cooling and ventilation, particularly adaptable to stores, restaurants and similar installations. The system consists essentially of a special type of fan, made in various sizes, with capacities from 15,000 cu. ft. to 35,000 cu. ft. per minute, so installed as to deliver outside air, under pressure, at or near the ceiling line and in such a manner that it will be distributed throughout the required volume in substantially uniform manner. The catalog is an excellent presentation of the subject, well photographed and shows a number of typical installations, both schematic and actual jobs that have been carried out. Size 8½ x 11. Pp. 16.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF THE HEATING AND VENTILATING MAGAZINE, published monthly at New York, N. Y., for October 1, 1926.

State of New York, County of New York, ss:

Before me, a notary public in and for the State aforesaid, personally appeared Arthur S. Armagnac, who, having been duly sworn, according to law, deposes and says that he is the editor of The Heating and Ventilating Magazine, and that the following is, to the best of his knowledge and belief, a true statement of said publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443 Postal Laws and Regulations printed on the reverse of this form to wit:

1. That the names and addresses of the publishers, editor, managing editor, and business managers are:

Publisher, Heating and Ventilating Magazine Co., 1123 Broadway, New York.

Editor, Arthur S. Armagnac, 1123 Broadway, New York.

Managing Editor, None.

Business Manager, Gustave Petersen, 1123 Broadway, New York.

2. That the owners are: (Give names and addresses of individual owners, or if a corporation, give its name and the name and address of stockholders owning or holding 1 per cent or more of the total amount of stock).

Heating and Ventilating Magazine Co., 1123 Broadway, New York.

Arthur S. Armagnac, 1123 Broadway, New York.

Gustave Petersen, 1123 Broadway, New York.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more or total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain, not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustee, hold stock and securities in a capacity other than of a bonafide owner and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

ARTHUR S. ARMAGNAC, Editor.

Sworn to and subscribed before me this 29th day of September, 1926.

REUBEN B. SMITH,
Notary Public, Kings Co.
(My term expires March 30th, 1927.)

Present Accepted Practice in Domestic Oil Burners

24. Sword. Gasifying, Combustion-Pot Type, Semi-Mechanical Draft, Gas Ignition.

Previous articles in this series are:

1. *Kleen Heet, July*, 1925.
2. *Baker, July*, 1925.
3. *Kerrihard, July*, 1925.
4. *Silent Glow, August*, 1925.
5. *Aetna, August*, 1925.
6. *Caloroil. September*, 1925.
7. *Oil-O-Matic, September*, 1925.
8. *Chalmers, October*, 1925.
9. *Hart, October*, 1925.
10. *Sun, October*, 1925.
11. *Rayfield, November*, 1925.
12. *A. B. C., November*, 1925.
13. *Electrol, December*, 1925.
14. *Grant, January*, 1926.
15. *Nu-Way, January*, 1926.
16. *Wayne, February*, 1926.
17. *May, February*, 1926.
18. *Ray Rotary, March*, 1926.
19. *Super Oil Heator, May*, 1926.
20. *Nokol, July*, 1926.
21. *Johnson, August*, 1926.
22. *Arrow, September*, 1926.
23. *Safe Fire, October*, 1926.

24—Sword

A BURNER, characterized chiefly by the use of a distinctive method of securing quiet combustion, is manufactured by Sword & Kimber Co., Philadelphia, Pa.

This is a pot-type burner, in which inert gases, taken from the combustion chamber, are introduced into the bottom of the fire pot, there to mix with the incoming oil-gas, which is thus thoroughly mixed with inert gases prior to the admission of air for combustion. The result is slow combustion that can scarcely be heard outside of the burner.

Oil is drawn to the burner by a ⅜-in. Viking pump, running at 850 R.P.M. and capable of delivering 30 gal. per hour, with a suction of 15 in. of mercury against a discharge pressure of 100 lbs. This pump is driven with a specially-designed belt by a ⅛ H.P. motor running at 1750 R.P.M. The motor is furnished for either 110 volts or 220 volts alternating, or for direct current. Excess oil not required for the load for which the burner is adjusted is returned to the tank.

The fire-pot, or more properly, the gas pot, is a cast-iron shell into which is molded a lining of Carbofrax cement. Surrounding this pot is an annular cast-iron shell, into which the secondary air is taken from a draft tube reaching down to the base of the ashpit door. The burner therefore might be classified as atmospheric, based upon the method of handling the bulk of the air for combustion. Air is delivered from the annular space around the gas pot, along its upper edge, through a series of vane-like openings which tend to give the air a swirling motion.

A Sword Installation

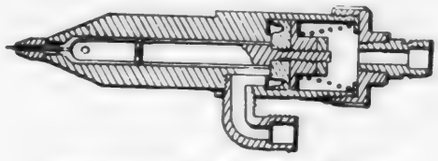
THE SUPPLY OF INERT GASES

Extending around about one-sixth of the circumference of the gas pot is a comparatively narrow opening, through which products of combustion are drawn. This opening connects to a flue terminating at the fan intake and through it inert gases are drawn by the blower and delivered to the blast pipe.

A primary air-register, on the opposite side of the blower, permits the handling of a definite amount of fresh air with the inert gases. The blower is direct connected to the motor and is a special vane type designed and manufactured by Sword & Kimber Company.

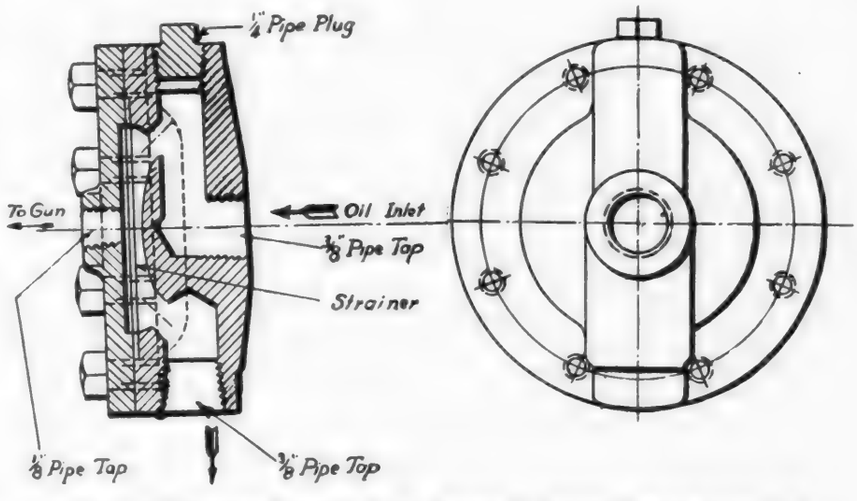
HOW THE FUEL IS PREPARED FOR COMBUSTION

The blast-pipe makes a right-angle bend from the fan outlet and then runs straight to the gas-pot, which it enters tangentially. Where the blast-pipe opens into the gas-pot, there is placed a rectangular bronze target with a double corrugated surface.



Cross-section of Sword Oil Gun

Located in the blast-pipe elbow at the blower is the oil gun, which is a vital feature of the Sword burner. The oil gun consists of a brass body, the discharge end of which is fitted with a removable tip, which may contain an 0.008 in., 0.010 in., 0.012 in., or 0.015 in. orifice, through which the oil is discharged. The axis of the oil gun passes approximately through the center of the target at the other end of the blast tube. The gun is fitted with a ⅞-in. piston, working against a spring loaded to 12 lbs. The front end of this piston carries a steel needle, which fits into the nozzle orifice. When oil is pumped to the forward side of the piston the spring is compressed and the steel pin withdrawn from the orifice. In this position, the gun ejects a stream of oil which passes down the axis of the blast pipe and strikes the slanting target. As this fine jet of oil is surrounded by hot inert gases, it is pretty thoroughly warmed in its passage of approximately 2 ft. before striking the target. As the gas pilot is located behind the target, which is kept hot by the pilot flame and



In this Oil Filter the Surface of the Screen is Washed by the Excess Oil, Carrying the Dirt Back to the Tank

by heat from the burner flame, it is very probable that the oil is both broken up mechanically and gasified in an inseparable manner. In any event, the hydrocarbon gas, diluted by the products of combustion and a small quantity of hot, fresh air, rises to the top of the pot and mixes with the incoming secondary air at the lip of the pot.

It is stated that combustion tests on the Sword burner show a flue gas containing from 14% to 15.3% CO_2, which indicates a degree of combustion closely approaching the ultimate.

RELIEF VALVE AND SELF-CLEANING STRAINER

The oil strainer, which is distinctive on this burner, consists of a vertical circular brass screen of fine mesh, over the surface of which the entire capacity of the pump is passed. The design of the screen casing is such that the oil is delivered at the upper edge of the screen disc and the discharge to the tank is at the bottom, so that all dirt that may be delivered with the oil is washed over the surface of the screen, with no tendency to be driven through it. The flushing of the surface of the screen keeps it practically clean at all times, as the oil seeps through the screen, rather than is driven through it.

A standard Lunkenheimer release valve, designed to Sword specifications, is used for maintaining constant pressure on the oil. When the burner is stopped, the removal of pressure on the forward side of the gun piston causes the piston to move forward under the influence of its spring and forces the cleaning needle through the orifice, preventing any drip of residual fuel. As this gun is located well outside of the boiler, there is no tendency for it to carbonize.

SAFETY DEVICES

The main safety device consists of an enclosed drip bucket connected to the lower part of the gas-pot and arranged with a door that must be opened to withdraw the drip pan. Until the pan is re-inserted and the door closed, it is impossible to start the burner. Standard boiler or furnace controls are used, inter-connected with the room thermostat in a conventional manner.

BALANCED DRAFT MAINTAINED

In order that the draft on the fire box be maintained constant, regardless of the chimney or atmospheric conditions, each Sword installation incorporates a balanced check damper attached to the smoke pipe. This is a conventional flat valve with weighted arm and it is stated that it will maintain the draft on the fire box within 0.001 in. water at all times. The Sword burner is built in only one size, designed to provide for not more than 1500 sq. ft. of steam radiation, but with the four nozzle sizes, it may be adapted to any requirements within this limit. The Sword burner is listed by the Underwriters to burn all fuels not heavier than 36° A.P.I.

Steel and Cast-Iron Boilers.

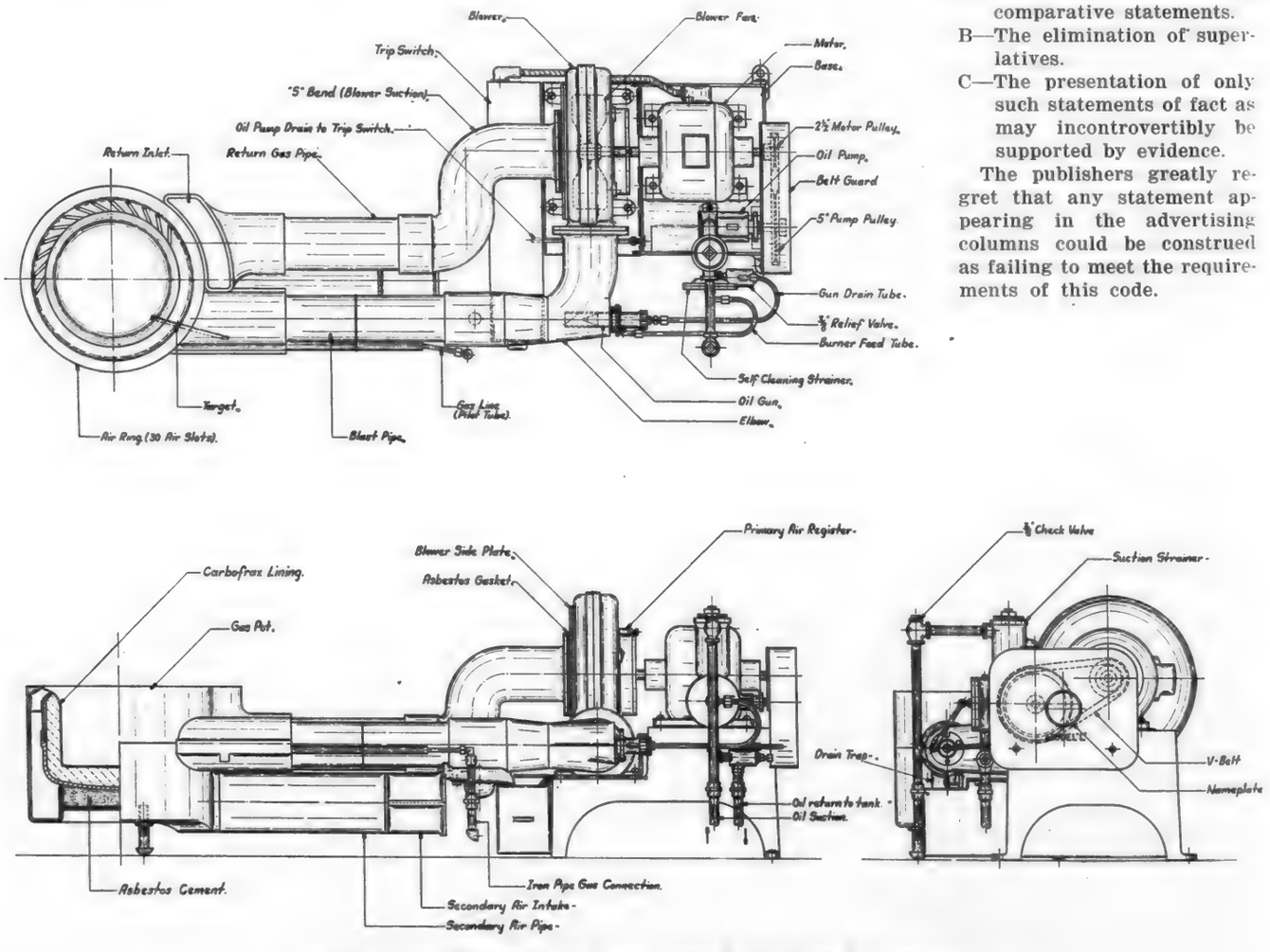
In a description of the installation of a Pacific steel heating boiler in the plant of the Bamberger-Reinthal Co., Cleveland, O., a recent advertisement of the General Boilers Co., Waukegan, Ill., in these columns, contained the statement that the installation replaced three cast-iron boilers and quoted the owner as stating that he was "unable to heat our building satisfactorily with cast-iron boilers," etc.

Of course, the comment quoted referred specifically to the single installation in question and was not intended to refer to cast-iron boilers in general.

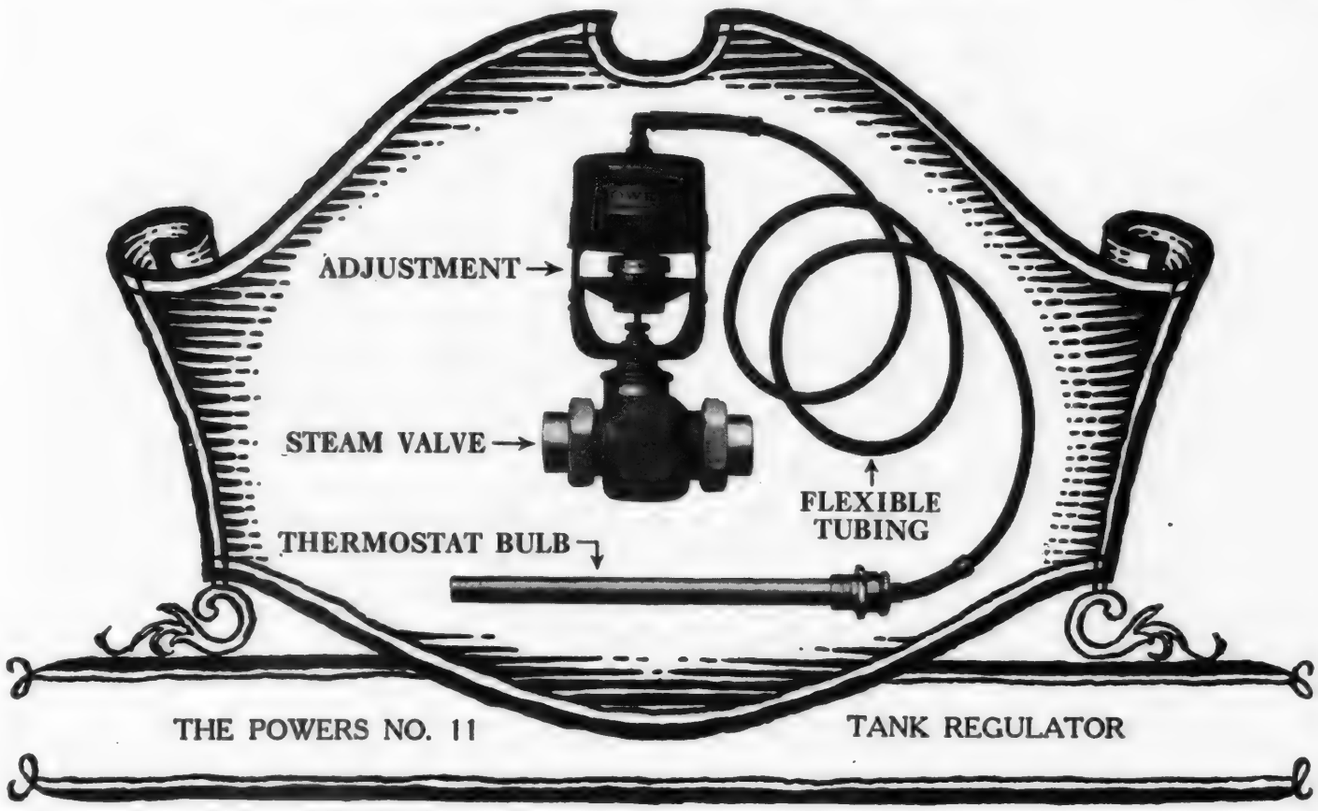
At the same time, the fact that such an inference could be drawn makes it desirable to state that THE HEATING AND VENTILATING MAGAZINE in all of its advertising pages strives to maintain the code which it has developed in connection with advertising copy, providing for:

A—The elimination of all comparative statements.
B—The elimination of superlatives.
C—The presentation of only such statements of fact as may incontrovertibly be supported by evidence.

The publishers greatly regret that any statement appearing in the advertising columns could be construed as failing to meet the requirements of this code.



Assembly of the Sword Oil Burner with Salient Details Indicated



After testing three other well-known regulators Ipswich Mills standardize on POWERS

Ipswich Mills, established in 1826, is the oldest manufacturer of good hosiery in America. This firm owns a group of large mills in Massachusetts. Because of the large number of temperature regulators used by them they made careful tests to determine which make of regulator was most ACCURATE and DURABLE.

The results of their test are shown in the following letter received from Mr. L. Kleeb, the General Manager.

> "We are very pleased to advise that we finally have adopted your regulator after having tried out three other well-known regulators on the market. We find same is giving excellent satisfaction in the way of greater uniformity in bringing through our colors, together with a considerable saving of fuel.
>
> "We are adopting this as our standard equipment when in the need of apparatus of this kind."

This is only one of many similar tests which have conclusively proved the claims we make for the regulator shown above.

"The Best Costs Less in the End"

THE POWERS REGULATOR COMPANY

36 years of specialization in temperature control

2718 Greenview Ave., Chicago

Atlanta	Charlotte, N. C.	Detroit	Los Angeles	New York	San Francisco	Seattle
Baltimore	Cincinnati	El Paso	Milwaukee	Philadelphia	CANADIAN OFFICES	
Boston	Cleveland	Houston	Minneapolis	Pittsburgh	Toronto	Winnipeg
Buffalo	Denver	Indianapolis	Nashville	Rochester	Montreal	Calgary
Butte, Mont.	Des Moines	Kansas City	New Orleans	St. Louis	Halifax	Vancouver

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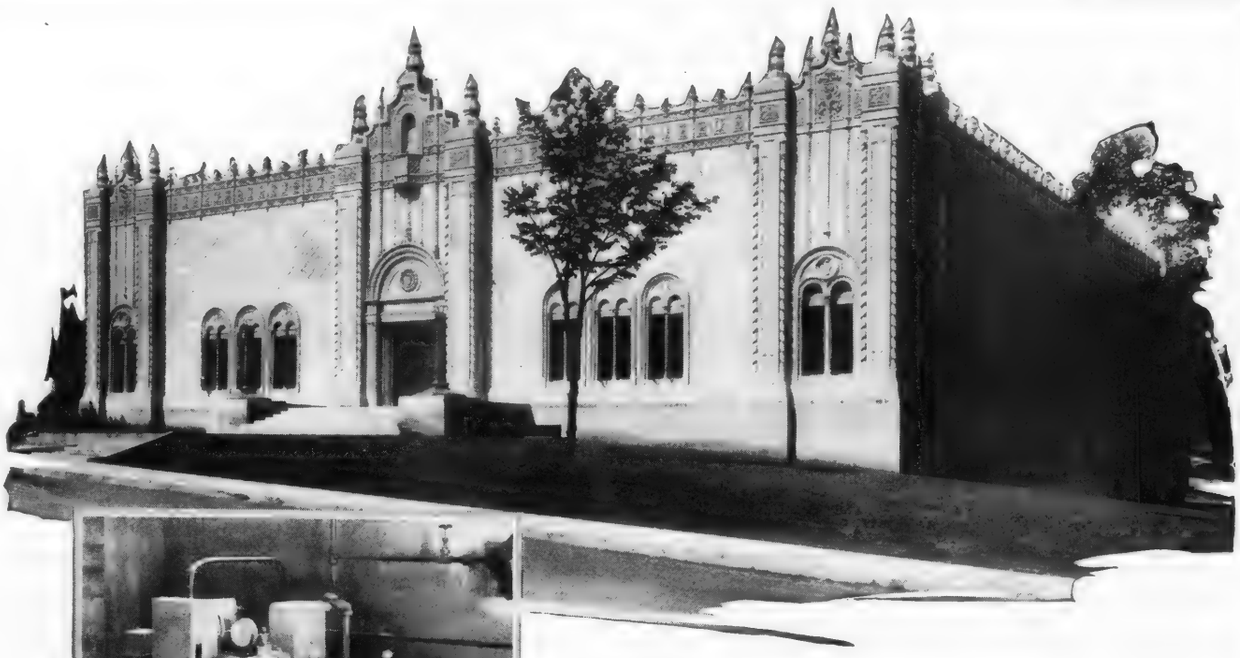
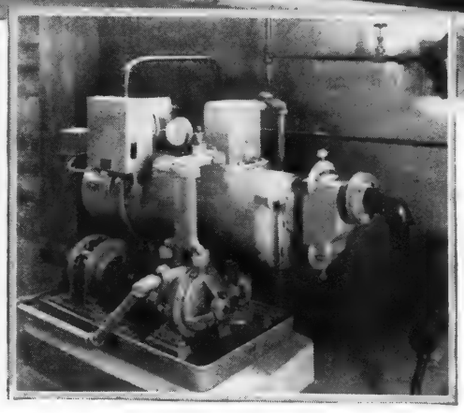




Above: Walker Art Gallery, Minneapolis, Minn. Equipped with Jennings Vacuum Pump. At Left: The motor-driven Jennings Vacuum Pump for removing the condensation and air from the return line of the steam heating system, Walker Art Gallery. Size B-20, suitable for 16,000 sq. ft. equivalent direct radiation.

Nothing but Jennings would do here

Even a cursory inspection of the Walker Art Gallery at Minneapolis would reveal that here is a building where good heating is a prerequisite. Where every item of heating equipment, from the boiler to the radiator, must be in keeping with the building, its appointments and its patrons.

Nothing but a Jennings Heating Pump would do. And a Jennings Heating Pump has been installed—for removing the condensation and air from the return line of the vacuum steam heating system. Jennings Pumps combine, to an unusual degree, simplicity of operation with unfailing dependability—two characteristics which make Jennings Pumps the logical choice for any fine building.

Write for bulletins which give all the facts.

NASH ENGINEERING COMPANY

SO. NORWALK **CONNECTICUT**

Branch Sales Offices: Atlanta, Birmingham, Boston, Buffalo, Chattanooga, Chicago, Cleveland, Dallas, Denver, Detroit, Indianapolis, Kansas City, Memphis, Miami, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Richmond, St. Louis, Salt Lake City, San Francisco, Seattle, Tampa, Washington, D. C. **In Canada:** Montreal, Toronto and Vancouver. **European Offices:** London, Eng., Norman Eng. Co.; Brussels, Belgium, and Amsterdam, Holland, Louis Reijners & Co.; Oslo, Norway, and Stockholm, Sweden, Lorentzen & Wettre.

Jennings Pumps

RETURN LINE AND AIR LINE VACUUM PUMPS CONDENSATION AND CIRCULATING PUMPS

2144-38

Trade and Miscellaneous Notes

Coming Events

November 16-19, 1926. Annual Fall meeting of the American Welding Society, at Broadway Auditorium, Buffalo, N. Y., November 17, 1926, with exhibition opening on November 16 and continuing over November 19. Afternoon of November 19 will be devoted to a trip to Niagara Falls.

December 6-11. Fifth National Exposition of Power and Mechanical Engineering, at the Grand Central Palace, New York, including a large exhibit of heating and ventilating apparatus. Space has already been reserved by 149 exhibitors of such apparatus. The exposition will be open daily from noon until 10:30 P. M., during the period above mentioned and, while visitors will not find the heating and ventilating apparatus segregated into a single section, they will be sure of seeing an exhibit which will interest them and be well worth their while.

November 29-30 and December 1-2, 1926. Tenth Safety Congress, in Rochester, N. Y.

December 16-17. Annual meeting of Association of Brass Manufacturers in New York.

January 25-28, 1927. Annual meeting of American Society of Heating and Ventilating Engineers in St. Louis, Mo. Headquarters at Hotel Statler.

Feb. 15-17, 1927. Forty-first annual general and general professional meeting of Engineering Institute of Canada, annual meeting being held in Montreal at the Institute headquarters on January 27, 1927, with adjournment to re-convene at Quebec, February 15, 16 and 17, 1927.

Feb. 1, 1927. Opening of permanent International Trade Exhibition, Exhibition Building, New Orleans, La.

February 21-March 5, 1927. Second Architectural and Allied Arts exposition, under the auspices of the Architectural League of New York, Grand Central Palace, New York. Executive offices, 105 West 40th Street, New York.

April 5-6-7, 1927. Annual convention of American Oil Burner Association, in Buffalo, N. Y.

May 10-13, 1927. Eighteenth annual convention of National District Heating Association, in West Baden, Ind. Headquarters at the West Baden Hotel.

Miscellaneous Notes

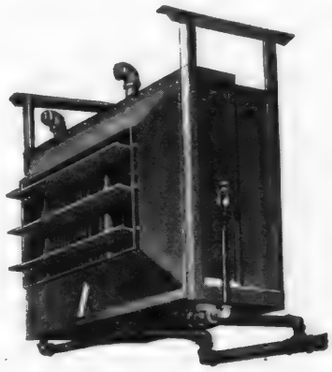
Construction reports, according to the F. W. Dodge Corporation's review of construction operations started in September, 1926, show that in 37 States east of the Rocky Mountains, the operations amounted to $562,371,400, which is 6% under August and only 1% under September, 1925. These 37 States include about 91% of the total construction volume in the country. New construction, however, started during the past nine months, shows an overall increase of 8% above the same period in 1925. Contemplated work in September, 1926, shows an increase of 9% over that of the previous month, but is 9% less than September of last year.

Washington, D. C.—The U. S. Civil Service Commission reports that additional architects, both associate and assistant, are required by the Office of the Supervising Architect, in order to carry out the $165,000,000 public building program recently authorized by Congress. Preliminary plans on many of the larger buildings, including some monumental structures for Washington, D. C., are already completed and the Civil Service Commission is now receiving applications for the various architectural positions available. Competitors are not required to report for examination, but will be rated on their education, training and experience, together with specimens of their draw-

ECONOMY *beyond belief!*

POSITIVE HEAT CONTROL

This means economy! If you do not have our Bulletin No. 70, write at once!



THE CEILING TYPE

at left. Also furnished for floor or sidewall suspension. See Bul. No. 70.

AUTOVENT UNIT HEATERS

Greater heating efficiency than direct radiation....no hot over-night fires....does not clutter up valuable floor space....even, instant heat distribution....affords better ventilation and air circulation....much easier to install....equipped with strong, dependable motor ....motor is **not** in path of heated air....practically no maintenance cost....a big market....factories....garages....textile mills....creameries....repair shops....foundries ....drill halls.

Estimates and prices cheerfully furnished by our Engineering Department.

AUTOVENT FAN & BLOWER CO.

730-738 W. Monroe St., CHICAGO

ENGINEERS IN ALL PRINCIPAL CITIES

ings. Complete information and application blanks may be obtained by addressing the U. S. Civil Service Commission, Washington, D. C., or from the secretary of the Civil Service Board, at the Post Office or Custom House of any city.

New York.—During the past three years, New York City has spent over $110,900,000 on 141 new school buildings and additions, thus providing additional sittings for 202,500 children. The number of school buildings now in existence is nearly 1000 and they have a value of $580,000,000. New buildings under construction, it is expected, will accommodate 28,000 additional children, although this is the smallest amount of work to be under construction for many months. The school building program is being gradually reduced from the enormous volume of several years ago down to a normal amount. The greatest construction activity is in Queens Borough, the Bronx comes next, with Brooklyn third, Richmond fourth and Manhattan last.

Philadelphia, Pa.—The Oil Burner Association of Philadelphia, at its meeting October 7, had for the chief topic of discussion the subject of gauges. No decision reached, but a committee was appointed to investigate the matter more fully and to report back at the next meeting.

Evansville, Ind.—The National Trade Extension Bureau reports the following schools in which those interested in heating and ventilating will find courses devoted to these subjects:

State Trade School, Bridgeport, Conn., with a course for steamfitter helpers, day and evening sessions, with an enrollment of four in this course.

Hartford Public School, Hartford, Conn., with a course for journeymen fitters, with day and evening sessions and an enrollment of 60 in the course.

Georgia Technical Evening School, with evening sessions only, with courses for steamfitters' helpers and journeymen fitters with an enrollment of one in each course.

Washburn School, Chicago, Ill., a part-time continuation school, with a course for steamfitters' helpers and an enrollment of 390 pupils in the course.

Murray Hill Vocational School, New York City, which has day and evening sessions, with courses for steamfitters' helpers and journeymen fitters and an enrollment of 16 in the helpers' and 25 in the fitters' course.

New York Trade School, New York City, with evening classes only and having a course for steamfitters' helpers and an enrollment of 30 in this course.

Public Schools of Schenectady, N. Y., which have an evening trade school with a course for steamfitters' helpers and an enrollment of 40 in this course.

Stivers High School, Dayton, Ohio, which is a part-time continuation and evening school with courses for both steamfitters' helpers and journeymen fitters. There are enrolled in these two courses 12 helpers and 15 fitters.

Dort School of Flint, Mich., an evening trade school with a course for steamfitters' helpers and an enrollment of three in the course.

Dunwoody Industrial Institute, Minneapolis, Minn., an evening trade school with courses for steamfitters' helpers and journeymen fitters, with an enrollment of 16 helpers and 17 fitters in these courses.

Boys Vocational School, Atlantic City, N. J., an evening trade school with courses for steamfitters' helpers and journeymen fitters with 30 helpers and 40 fitters enrolled in these two courses.

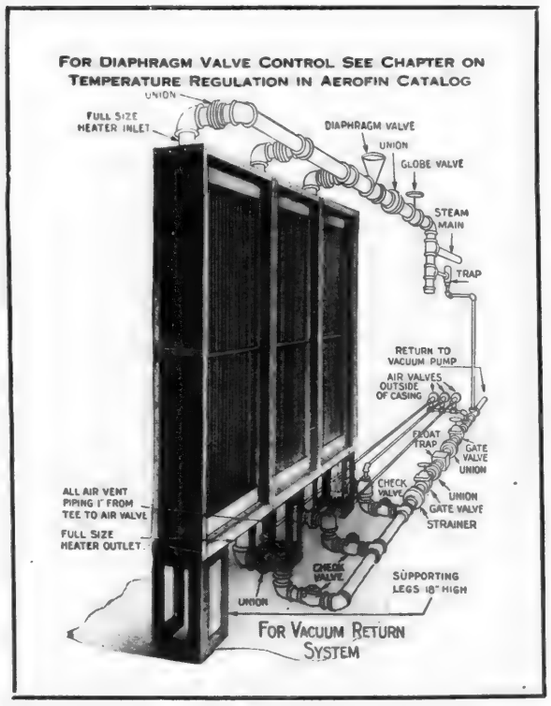
Paterson Vocational School of Paterson, N. J., an all day and evening school, with a course for journeymen fitters and an enrollment of two in this course.

Carnegie Institute of Technology, Pittsburgh, Pa., an evening trade school with courses for journeymen fitters and steamfitters' helpers, with an enrollment of 20 helpers and 40 fitters in these two courses.

Crockett Technical High School, Memphis, Tenn., a part-time continuation school and evening school with a course for steamfitters' helpers and an enrollment of 33 in this course.

Maury High School, Norfolk, Va., an evening school with a course for steamfitters' helpers and an enrollment of five in this course.

Appleton Vocational School, Appleton,



AEROFIN CORPORATION
750 Frelinghuysen Avenue
Newark, N.J.

L. C. Soule, *Sec'y and Sales Manager*

AEROFIN

Fan-System Heating Surface

To Engineers, Architects and Contractors

The Vertical Tube Arrangement of Aerofin is preferred because it guarantees perfect drainage of condensation and is less subject to errors of installation and operation. The Horizontal Tube Arrangement may be used when installed in accordance with our instructions and diagrams.

The Labor Cost of Installing Aerofin is practically nothing. Two men (without tackle) can handle the units and fit them together like building blocks. **Why pay 20 cents per foot of heating surface for labor of erecting TONS of cumbersome heaters? Use Aerofin and cut down your installed cost for Heaters.**

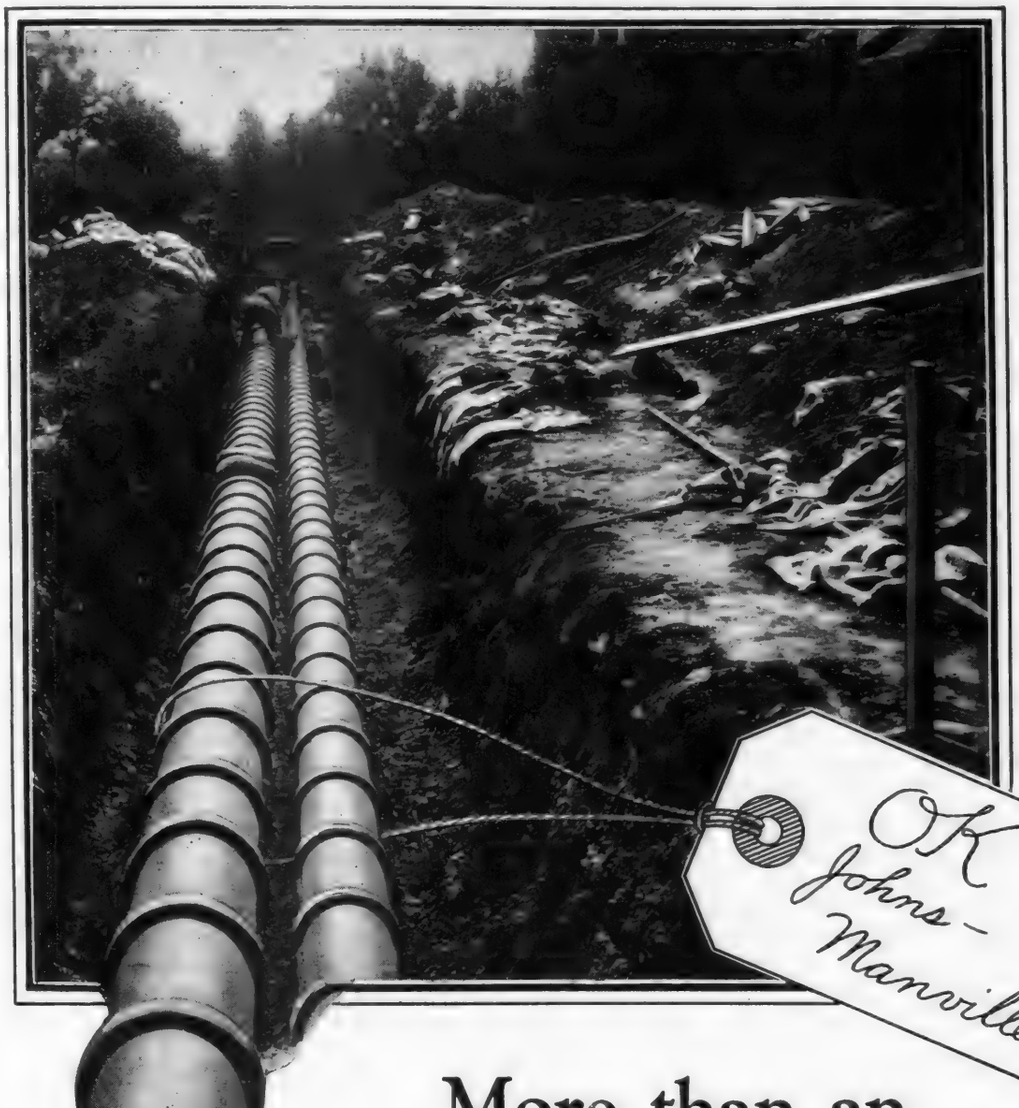
Aerofin weighs only 1/10 to 1/4 as much as the old fashioned heavy heaters.

Aerofin saves a great deal of space.

Aerofin is made of non-corrosive metals.

Since there is no equal to Aerofin why not specify it outright? Plans and specifications should show sizes, number and arrangement of units with piping details.

Write for catalog, instruction leaflet and service details.
Aerofin is Sold ONLY by Manufacturers of Nationally Advertised Blower Heating Apparatus.



At less than half the cost of a walking tunnel, the Johns-Manville Underground System of Insulation offers you a highly efficient and economical method of running steam and hot water lines underground.

More than an F. O. B. Insulation

THE Johns-Manville Underground System of Insulation is not, and should not be, sold F.O.B. our factories or your trench.

It is not just a number of parts easy to assemble, but a system that Johns-Manville installs and then guarantees to be at least 90% efficient.

This high efficiency and Johns-Manville's guarantee are obtainable only by correct design and manufacture of the integral parts and the assembly of these parts by competent and experienced Johns-Manville men.

Whenever you contemplate running pipe lines underground consult Johns-Manville.

JOHNS-MANVILLE INC., 292 Madison Ave. at 41st Street, New York City
Branches in all large cities For Canada: Canadian Johns-Manville Co., Ltd., Toronto

Asbestos and its allied products
INSULATION
BRAKE LININGS
ROOFINGS
PACKINGS
CEMENTS
FIRE PREVENTION PRODUCTS

JOHNS-MANVILLE

Underground System of Insulation

Wis., a part-time continuation and evening school, with a course for journeymen fitters and an enrollment of four in this course.

Fond-du-lac Vocational School, Fond-du-lac, Wis., a part-time continuation and evening school, with a course for journeymen fitters and an enrollment of three in this course.

Pittsburgh, Pa.—Characterizing foul air and poor ventilation as the chief aids to the "White Plague," the United States Bureau of Mines, in Pittsburgh, Pa., advises that a staff of scientists, under the direction of the bureau, is making rapid progress in experiments to annihilate the causes of respiratory diseases.

Physicians of the U. S. Public Health Service are making tests on 250 men to determine the effect of varying climatic conditions on them, as well as the effect of excessive heat such as men experience when working in steel mills, glass factories and other heat-utilizing processes. It is predicted that within the next ten years, science will have lengthened the average American life from five to ten years. The experiments involve the use of ice machines for cooling down to zero, steam heat for producing temperatures up to 180° F. and apparatus for producing fog, rain and the entire scale of humidity from 15% relative to 100% or saturation. Miniature storms are created by a battery of twenty small airplane propeller-type, electric fans, which produce wind velocities from cool soothing breezes up to snappy gales. Accuracy in weighing results is obtained by a special gold bullion scale specially supplied from the U. S. Treasury Department, which weighs a man so minutely as to reflect to a difference of 0.0001% of the man's weight.

New Haven, Conn.—The staggering loss of 75,000 lives within the United States in the two months from February 14 to April 15, due to violent and unexpected changes in the weather, is the startling assertion made by Professor Ellsworth Huntington, of Yale University. This is only from sharp fluctuation of temperature and does not include losses from disaster such as the Florida catastrophe, he adds, and claims that the coolest cities are the most healthful, having a death rate of only 2.6 per thousand against 5.2 in the warmest ones. Placing an economic value to the nation of $7000 on each life so lost, Professor Huntington computes that the cost of such deaths for the two months' period mentioned comes to over $500,000,000.

London, England.—The coal strike in England has cost that country up to September 1, 1926, about $145,000,000, according to the calculations made by Basil Miles, American Commissioner to the International Chamber of Commerce and embodied in a report to the American Section.

Third Annual Three-Day Institute for the Plumbing and Heating Industry will be held at the Carnegie Institute of Technology, Pittsburgh, Pa., January 18-20, 1927. The institute will be conducted by the Department of Industrial Relations, with the cooperation of the Department of Plumbing, Heating and Ventilating of Carnegie Institute of Technology.

St. Louis, Mo.—The battle against smoke is put squarely up to the public by Osborn Monnett, consulting engineer of the Citizens' Smoke Abatement League of St. Louis. Mr. Monnett declares that the smoke movement in this country is just beginning to pick up the loose ends where they were left ten years ago and that growing sentiment in favor of smoke abatement will finally result in this accomplishment. He adds that nothing will clean up our cities but a sufficiently strong and maintained public demand.

Evansville, Ind.—The National Trade Extension Bureau is stimulating Christmas sales during the period of November 15 to December 24, by bringing to the attention of everyone connected with the industry the fact that a coordinated selling drive during this period will meet the public at a time when purse strings are loosened and a certain amount of buying is expected to be done by all. Whether they buy radios or radiators is up to the trade and the sales efforts exerted.

Green County, Mo., Health Unit made the study of ventilation its health activity in the schools, during the month of

There Is No Longer Room for Doubt

"This is indeed the Perfect Mushroom Ventilator"

Nu-Notch
REG. U.S. PAT. OFF.

Such is the verdict of a band of experts after a thorough consideration, who were looking for the very finest equipment that money could buy for the Paramount Theatre in Times Square, New York.

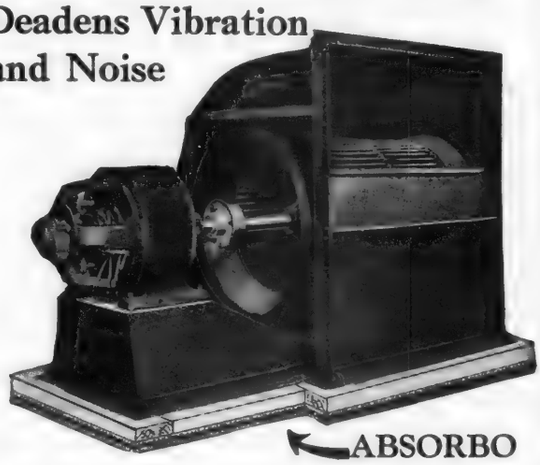
The Knowles Nu-Notch was selected for its many good features plus its low cost.

Let us send full details.

Knowles Mushroom Ventilator Co.
202-204 Franklin St. NEW YORK CITY

"ABSORBO"

A Machine Foundation that Deadens Vibration and Noise

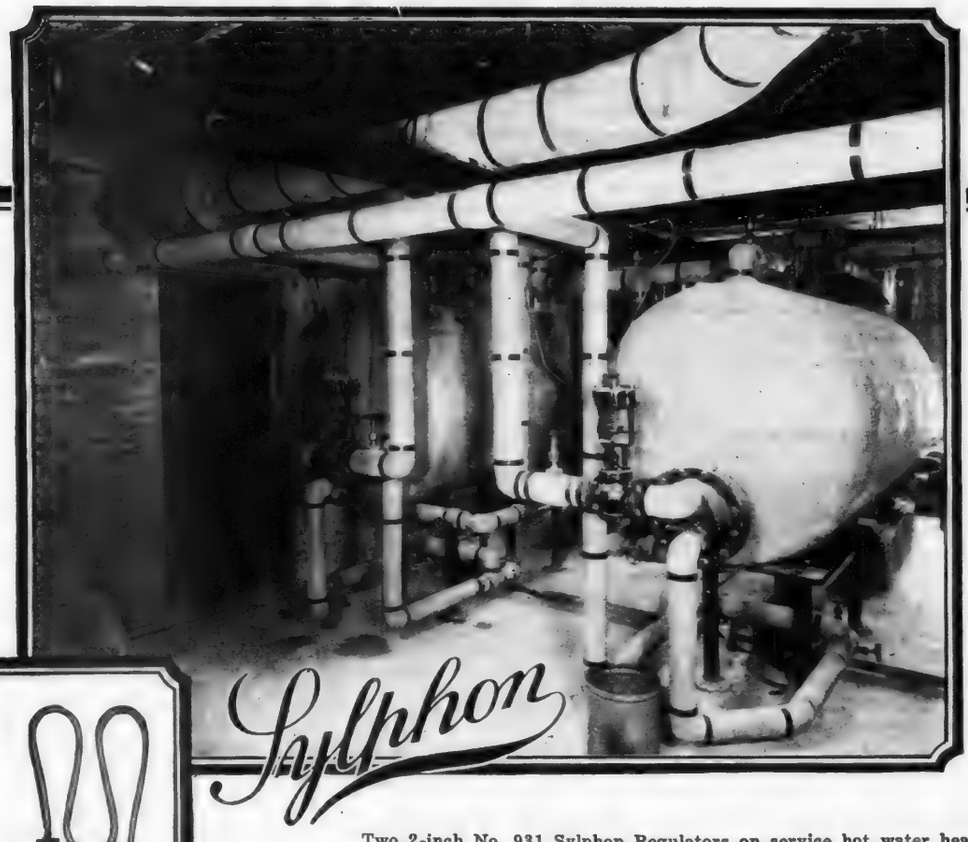


When "Absorbo" is used beneath the base of a fan or motor, vibration is arrested and noise eliminated.

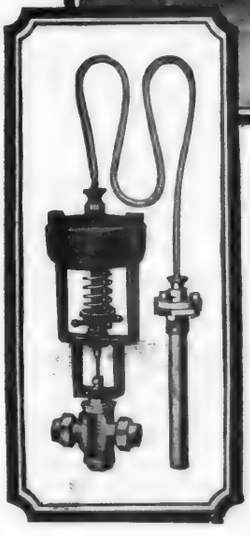
ABSORBO is virgin cork, impregnated with creosote, impervious to water, retaining its natural oils.

Our engineers will help solve your problems without obligation.

Cork Foundation Company
315 Fifth Avenue, New York



Two 2-inch No. 931 Sylphon Regulators on service hot water heaters of the Camden County Tuberculosis Hospital, Asyla, N. J.
Mr. Arnold H. Moses, Architect
Mr. Frank H. Schaeffer, Cons. Engr.
Camden Heating Company, Contractors
This hospital is heated by the Webster Vacuum System of Steam Heating.



Another Hospital with Sylphon Automatic Control of Service Hot Water

Sylphon Temperature Regulators meet the exacting demands of the modern hospital for plenty of hot water—not too hot—not too cool. They automatically maintain a steady supply of hot water at the right temperature without attention, and without repairs—not only in hospitals, but in every other type of building where service hot water is required.

Easy to install—because they have no outside accessories of any kind, and require no auxiliary power, Sylphon Regulators guarantee completely satisfactory control of hot water systems with a minimum consumption of steam.

Install Sylphon Temperature Regulators on all your service hot water jobs, big or small.

This can be done hundreds of thousands of times—
AND NO APPRECIABLE LOSS OF FLEXIBILITY WILL DEVELOP IN THE ALL METAL, SEAMLESS SYLPHON BELLOWS
Sylphon

The secret of economical and reliable automatic temperature control is the Sylphon Bellows, which is the motor element in every Sylphon Regulator. This bellows, drawn and formed seamless, is the most accurate, flexible and durable expansion unit known.

Ask us to send Bulletin WTR-110

THE FULTON COMPANY KNOXVILLE, TENN.

ORIGINATORS AND PATENTEES OF THE SYLPHON BELLOWS

Sales Offices in: NEW YORK, CHICAGO, DETROIT, BOSTON, PHILADELPHIA, *and all the principal cities in U. S.*
European representatives: Crosby Valve & Engineering Co., Ltd., 41-42 Foley Street, London, W. I., England
Canadian representatives: Darling Bros., Ltd., 120 Prince Street, Montreal, Canada

October. Letters to the teachers and pupils were prepared and the advantages of proper ventilation were discussed, particularly in relation to the spread of contagious diseases, better conditions for study, amount of humidity and most desirable temperature for the rooms.

New York.—The Milbank Memorial Fund will open in November of this year its new $250,000 model health center at 325 East 38th Street. This memorial fund was established twenty years ago by Elizabeth Anderson and is spending $2,000,000 for the promotion of public health work. The building is a five-story brick structure and will house tuberculosis, social hygiene, dental and infant welfare clinics.

Hal C. Kimbrough, Western manager of the American District Steam Company, is receiving the congratulations of his many friends on his marriage to Miss Achsah Gardner, of Chicago, which took place in Paris, July 24, at the Episcopal Church on Avenue George V. After their wedding Mr. and Mrs. Kimbrough spent some time in Lucerne and Paris until August 15, when they sailed for America. They are now "at home" at the Virginia Hotel, Chicago.

Manufacturers' Notes

Aerofin Corp., Newark, N. J., announces the opening of an office in New York City at 39 Cortlandt Street, in charge of L. C. Soule, secretary. J. J. Schmidt, of the Aerofin Corporation, will also make his headquarters in this office.

Minneapolis Heat Regulator Co., Minneapolis, Minn., has recently completed a new six-story factory building at Fourth Avenue, South and 28th Sts., Minneapolis, and is now starting the foundation work on a $300,000 tower, 12 stories high, to surmount the structure. This tower will be 40 ft. x 45 ft. and will overlook all other buildings in the vicinity. It is intended to illuminate this tower at night so that it will be visible for many miles.

Walter Keiser, formerly of the Air Conditioning and Engineering Co., St. Louis, is now associated with Montgomery Brothers, Chicago, distributors for the United States Ozone Company. Mr. Keiser is in charge of sales in the St. Louis territory.

Jenkins Bros., New York, after a thorough trial covering four years of practical experiment, has endorsed the five-day week of 48 hrs. without reservation as an absolute success in its Bridgeport factory. The absentees' record shows a wonderful improvement and the production per hour is better. The system was put into effect May 22, 1922, and will apparently continue indefinitely, inasmuch as both the management and employees heartily favor the idea.

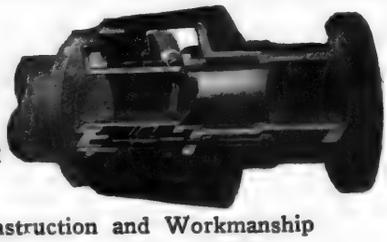
Chicago, Ill. In connection with the statement in last month's issue that R. F. Fahey had been appointed vice-president and district sales manager of Aetna Modern Utilities Company of Providence, R. I., it should be stated that Mr. Fahey's headquarters are in Chicago, where he has charge of the company's Chicago branch. The company's representative in Illinois is R. E. Murphy. Both Mr. Murphy and Mr. Fahey formerly represented the Hardinge Fuel Oil Heating Company of Chicago.

H. A. Kunitz has become associated with the Federal Burner Corporation of Bridgeport, Conn., manufacturers of the Federal burner. Mr. Kunitz was formerly connected with Electrol, Inc., of St. Louis, Mo.

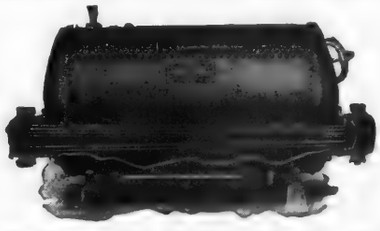
Central Station Heating Notes

Kalamazoo, Mich.—On December 7, 1926, Kalamazoo will vote on the question of district heating or no district heating. A proposition to install such a system has been made to the city by William Shakespeare, Jr., who proposes to finance and build a central heating station in the downtown district. A vote is necessary on the ordinance to give a franchise to permit laying of lines through the public streets for a period of thirty years. The city is to have the first right to purchase or lease the plant and a favorable opinion of three-fifths of the voters is necessary

ROSS
Crosshead-
GUIDED
Expansion Joint
Excels in



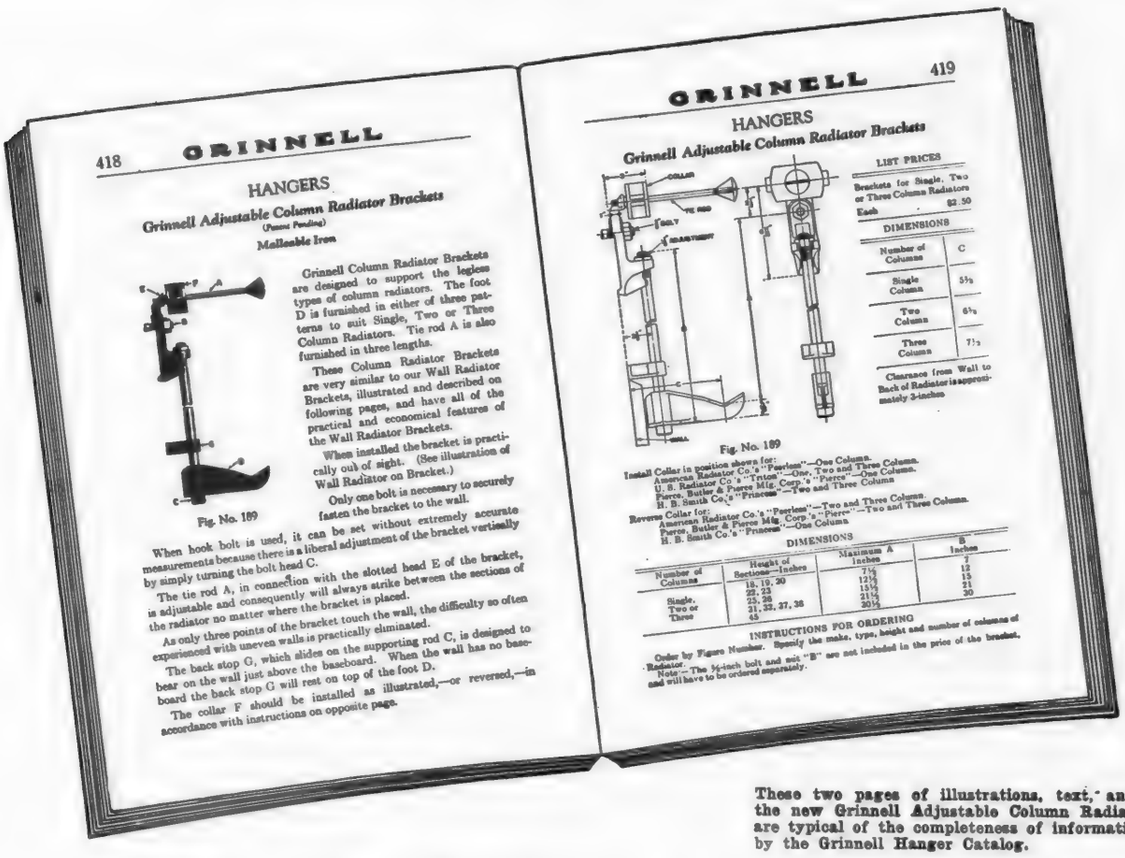
Design, Construction and Workmanship
Over 60% of sales—Repeat Orders
Once Used—Always Demanded
Every Purchaser—A Customer
ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.
New York, Chicago, Philadelphia, Boston, Cleveland, St. Louis, Detroit, Pittsburgh, Baltimore, San Francisco, Seattle, Denver, Salt Lake City, Omaha, Montreal, Toronto.



Alberger-Buffalo Storage Heaters have tubes the full length of tank which insures maximum heat transfer. Satisfaction guaranteed. Write for information on Alberger Multi Head Heaters and Howard Guided Expansion Joints.
ALBERGER HEATER COMPANY
HOWARD IRON WORKS
281-289 Chicago St. Buffalo, N. Y.

TURTLEBACK
TRADE MARK

Free Flow of Air! No Obstruction! Close Regulation!
The TURTLEBACK Air Diffuser is an improved floor ventilator, easily installed beneath the seats of theatres, schools and similar types of buildings; simply adjusted and locked rigidly in place by the center set screw.
Notches of 1/16 variations provide close regulation. Lack of obstruction allows the free flow and distribution of air. *Write for Illustrated Catalogue.*
Exclusive Territory Open to Representatives.
VENTILATING PRODUCTS CO. Not Inc.
2800 Cottage Grove Ave., Chicago, Ill.



418 GRINNELL

HANGERS

Grinnell Adjustable Column Radiator Brackets

(Patent Pending)

Malleable Iron

Fig. No. 189

Grinnell Column Radiator Brackets are designed to support the legless types of column radiators. The foot D is furnished in either of three patterns to suit Single, Two or Three Column Radiators. Tie rod A is also furnished in three lengths.

These Column Radiator Brackets are very similar to our Wall Radiator Brackets, illustrated and described on following pages, and have all of the practical and economical features of the Wall Radiator Brackets.

When installed the bracket is practically out of sight. (See illustration of Wall Radiator on Bracket.)

Only one bolt is necessary to securely fasten the bracket to the wall.

When hook bolt is used, it can be set without extremely accurate measurements because there is a liberal adjustment of the bracket vertically by simply turning the bolt head C.

The tie rod A, in connection with the slotted head E of the bracket, is adjustable and consequently will always strike between the sections of the radiator no matter where the bracket is placed.

As only three points of the bracket touch the wall, the difficulty so often experienced with uneven walls is practically eliminated.

The back stop G, which slides on the supporting rod C, is designed to bear on the wall just above the baseboard. When the wall has no baseboard the back stop G will rest on top of the foot D.

The collar F should be installed as illustrated,—or reversed,—in accordance with instructions on opposite page.

GRINNELL 419

HANGERS

Grinnell Adjustable Column Radiator Brackets

LIST PRICES

Brackets for Single, Two or Three Column Radiators
Each $2.50

DIMENSIONS

Number of Columns	C
Single Column	5½
Two Column	6½
Three Column	7½

Clearance from Wall to Back of Radiator is approximately 3-inches

Fig. No. 189

Install Collar in position shown for:
American Radiator Co.'s "Peerless"—One Column.
U. S. Radiator Co.'s "Tricto"—One, Two and Three Column.
Pierce, Butler & Pierce Mfg. Corp.'s "Pierce"—One Column.
H. B. Smith Co.'s "Princess"—Two and Three Column.

Reverse Collar for:
American Radiator Co.'s "Peerless"—Two and Three Column.
Pierce, Butler & Pierce Mfg. Corp.'s "Pierce"—Two and Three Column.
H. B. Smith Co.'s "Princess"—One Column

DIMENSIONS

Number of Columns	Height of Sections—Inches	Maximum A Inches	B Inches
Single, Two or Three	18, 19, 20	7½	7
	22, 23	12½	12
	25, 26	13½	13
	31, 32, 37, 38	21½	21
	45	29½	30

INSTRUCTIONS FOR ORDERING

Order by Figure Number. Specify the make, type, height and number of columns of Radiator.

Note:—The ⅝-inch bolt and nut "B" are not included in the price of the bracket, and will have to be ordered separately.

These two pages of illustrations, text, and tables on the new Grinnell Adjustable Column Radiator Bracket are typical of the completeness of information provided by the Grinnell Hanger Catalog.

Grinnell Issues a New Hanger Catalog

Mail With Your Letterhead

Grinnell Company, Inc., 280 W. Exchange St., Providence, R. I.

Please send along.....copies of the new Grinnell Hanger Catalog for the members of our staff who work on piping specifications.

Name .....

Address .....

NEW items have been added to the Grinnell Line of Adjustable Hangers. New improvements have been developed. All are covered in the new Grinnell Hanger Catalog.

It shows more than a hundred kinds of Grinnell Adjustable Hangers, Wall Brackets, Expansion Cases, Saddle Hangers, Pipe Rolls and Radiator Brackets that provide for every condition encountered in hanging and supporting piping systems.

As in previous editions, dimensional tables and scale drawings are provided for each model. This data has proved invaluable in reducing the time ordinarily consumed to draw up hanger specifications.

We'll be glad to supply a copy of the new Grinnell Catalog for each member of your drafting room. Tell us how many you need via the coupon.

GRINNELL

Brackets, Fittings, Hangers, Valves,
Pipe Bending, Welding, Piping Supplies, Etc.

before the street franchise can be passed.

Escanaba, Mich.—An interesting account of a mixture of steam and politics is given in the *Escanaba* (Mich.) *Press*, issue of September 19, 1926, from which it seems that the city was prevented from getting a good proposition signed up by the filibuster tactics of a minority. The facts, as given in the account, are briefly as follows:

The city had some surplus steam generated at the city lighting plant, which it was thought could be sold for heating some nearby public building. Finally, an adjacent hotel was persuaded to try the scheme and a contract was prepared for signature of the hotel by the city council and city manager.

In the meantime, the opposition political faction started adverse agitation and even threatened legal action to prevent the carrying out of the contract. Upon this development the hotel people, naturally looking for heat and not for lawsuits, returned the contract unsigned to the council and advised them that through private investigations, which they had just completed, they had found they could heat their building cheaper than for the amounts specified in the contract awaiting signature. It now seems doubtful if the contract will ever be signed at all, at least not without some modification in the amount.

New Corporations

Alwood Oil Burner Co., Woburn, Mass., capital $25,000, to manufacture oil burners. Incorporators: Arthur J. Moore, Perley C. McKeen, James O. Alwood and E. P. Matson, all of Woburn, Mass.

Barron-Wrape Co., St. Louis, Mo., capital $20,000, to manufacture oil burners. Incorporators: Louis E. Maginnis, Matthew F. J. Byrnes and W. H. Wrape.

Heat Equipment Co., St. Louis, Mo., capital $25,000, to manufacture oil burners and heating specialties. Incorporators: Roland Geiger, W. J. Patton and J. F. Lally.

Nu-Way Oil Heating Co., Boston, Mass., capital $50,000. Incorporators: Edward J. Dowd, Brookline, Mass.; Francis D. Kirby, Chestnut Hill, Mass., and L. P. Herlihy of Newtonville, Mass.

Rayfield New England Oil Burner Corp., Boston, Mass. Officers: John N. Worcester, Cambridge, Mass., president; W. B. Smith-Whaley, Jr., Winthrop, Mass., treasurer; M. M. Pheney, Melrose, Mass., secretary.

New Firms

W. L. Ticer, consulting and mechanical engineer, Washington, D. C., announces his association with Colonel P. M. Anderson, consulting engineer, with offices at 1026 Investment Building, 15th and K Sts., N.W., Washington, D. C. This firm will undertake mechanical equipment of buildings, heating, ventilating, power plants, plumbing, refrigeration, electrical work covering design, supervision investigation and reports. Catalogs and literature relative to the above are requested.

Contemplated New York State Projects

Albany, N. Y.—Department of Architecture, State of New York, Sullivan W. Jones, State architect, announces the following contemplated work:

Staff Building, State Hospital, Binghamton, N. Y., for the State Hospital Commission, Capitol, Albany. Bids will be received about December, 1926.

Employees' Home, Binghamton State Hospital, for the State Hospital Commission, Capitol, Albany. Bids will be received in February, 1927.

Nurses' Home, Gowanda State Hospital, Helmuth, N. Y., for the State Hospital Commission, Capitol, Albany. Bids will be received about February, 1927.

Staff Accommodations, Gowanda State Hospital, Helmuth, N. Y., for the State Hospital Commission, Capitol, Albany. Bids will be received about December, 1926.

Refrigerating Plant, Middletown State Hospital, Middletown, N. Y., for the State Hospital Commission, Capitol, Albany. Bids will be received about December, 1926.

New hospital, Psychiatric Institute, New York City, for the State Hospital Commission, Capitol, Albany. Bids will be received in November, 1926.

New dormitory building, "R" and underground connections, State School for Mental Defectives, Rome, N. Y., State Superintendent of Purchase, Capitol, Albany. Bids will be received about January, 1927.

Four Years of Community Heating in Decatur, Illinois

THE West Side residents of Decatur, Illinois, are very enthusiastic over their small community heating plant, which has now entered its fourth season. Fathered by H. S. Gebhardt and F. W. Cruikshank, the plant was designed and supervised during its installation by F. W. Cruikshank. It was built by W. E. Adams, and the first steam was turned on January 1, 1923, with ten consumers connected to the distribution lines.

Since then, additional homes have been added until a total of twenty-three are now being served, with the plant still having capacity for five additional connections when required.

The steam distribution system operates at 15 lbs. pressure, being fed from two Kewanee down-draft boilers of 8400 sq. ft. heating capacity. Steam is produced at 85 to 90 lbs. pressure and reduced to 15 lbs. by passing through a Mueller regulating and reducing valve. From the mains, the steam is introduced to the house services at 8 oz. to 1 lb. pressure.

The entire installation is run on a co-operative basis, the cost per pound of steam for the season being determined and charged against the various consumers, according to their respective meter readings. Included in the cost

MANUFACTURED WEATHER
makes
"Every day a good day"
Humidification · Dehumidification
Heating · Ventilation · Purification
Drying
Carrier
Engineering Corporation
750 Frelinghuysen Ave. Newark, N. J.
Boston Cleveland Chicago New York Philadelphia Los Angeles Kansas City
SEE OUR DETAILED DATA IN A.S.H.&V.E. GUIDE
SEE OUR DETAILED DATA IN A.S.H.&V.E. GUIDE

Sturtevant *Unit Heaters*

REG. U.S. PAT. OFF.

Sturtevant—

a mark that will never fail you

On a product it is our acknowledgment of a responsibility that does not end when that product is sold.

For over 60 years the name Sturtevant has stood for heating and ventilating equipment of highest efficiency and unvarying dependability. We will never let it stand for anything less.

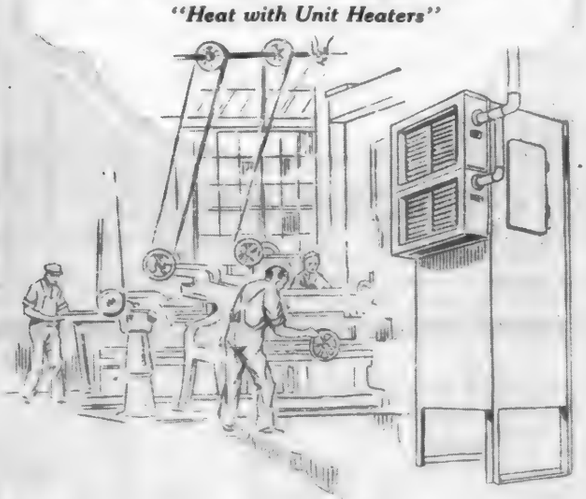
Recommend and install Sturtevants—and know that your judgment is backed up by a nation-wide organization whose mark is a contract, never avoided.

Have you received our new Sturtevant Unit Heater Catalog? If not, we would welcome your request for a copy.

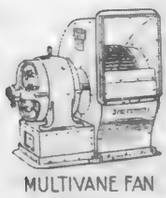
B. F. STURTEVANT COMPANY
Hyde Park, Boston, Mass.

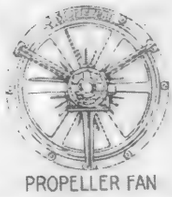
Atlanta	Chicago	Detroit	Minneapolis	Rochester
Boston	Cincinnati	Hartford	Montreal	St. Louis
Buffalo	Cleveland	Indianapolis	New York	Salt Lake City
Camden	Dallas	Kansas City	Pittsburgh	San Francisco
Charlotte	Denver	Los Angeles	Portland	Seattle
		Toronto	Washington	

"Heat with Unit Heaters"



SILENTVANE FAN


MULTIVANE FAN


PROPELLER FAN

VENTILATING FAN

per pound is a 10% allowance for a sinking fund to cover depreciation, replacement, etc.

The cost of heating the twenty-three homes supplied last winter ran between $68, as a minimum, and $366, as a maximum. This was at the rate of 62¼c per 1000 lbs. of steam and included the 10% allowance above mentioned. Most of the homes ran around $100 to $140. Steam is produced at the evaporative rate of 5,638 lbs. per pound of coal, this being the average for the season, covering both high and low heating loads, banking, etc.

The officers of the Community Heating Plant are H. S. Gebhardt, president; Robert Mueller, secretary and treasurer; F. W. Cruikshank, manager, and Robert Davis, engineer.

WANTED

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

FOR SALE—Pipe-threading and cutting machine, 1-in. to 8-in. pipe. Complete with dies. In perfect condition. $350.00. Wonderful value. Address Box 92, care of Heating and Ventilating Magazine.

MANUFACTURER'S REPRESENTATIVE—Manufacturer of complete line of fans, air washers and unit heaters desires recognized representatives on commission basis. Address Box 53, care of Heating and Ventilating Magazine.

SALES ENGINEER WANTED—Position in local New York territory. Send your qualifications in writing. Address Box 111, care of Heating and Ventilating Magazine.

REPRESENTATIVE WANTED — Experienced representative covering architects and heating trade in western New York invites correspondence from manufacturer with the view of additional line on commission or other arrangement. Address Box 112, care of Heating and Ventilating Magazine.

SALESMEN WANTED—Radiator and boiler salesmen. Give previous experience in first letter. All applications will be held in strict confidence. Address Union Radiator Company, Johnstown, Pa.

POSITION WANTED—Experienced heating estimator and installation superintendent desires connection with heating contractor. Available January 1, 1927. Address Box 113, care of Heating and Ventilating Magazine.

REPRESENTATIVE WANTED—Manufacturer of small steel heating boilers desires representation by capable, trained men of personality, who can handle the sales of such equipment on a commission basis. Some well-located territory is available for men who can see a future for themselves. Address Box 114, care of Heating and Ventilating Magazine.

Attention Heating Men

Use these long evenings to enlarge your Trade Knowledge in a comprehensive and systematic manner—in Plan Reading, Drafting, Estimating, Design and Engineering, Contracting.

We can Coach you in the Full Industry, or in any Specialized branches, or in a mixture of Heating, Plumbing, Business Subjects. We can provide you with a program that will enlarge your opportunities for greater service wonderfully.

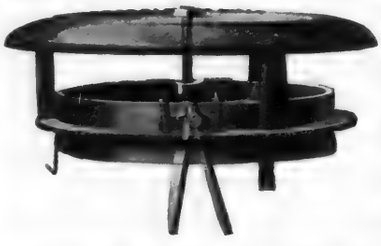
We Coach You In Your Own Home, Personal, Clear, Direct.

Full information about any subject sent free. Indicate your choice of Course when writing.

HEATING AND VENTILATING ENGINEERING
SPECIAL STEAM AND WATER HEATING
SCIENTIFIC WARM AIR HEATING
PLUMBING AND SANITARY ENGINEERING
CONTRACTING AND ESTIMATING
MECHANICAL DRAFTING

Make your spare moments earn you dividends

ST. LOUIS TECHNICAL INSTITUTE
4543 Clayton Avenue, St. Louis, Missouri



E-Z DAMPER GRIP-TITE Floor Vents

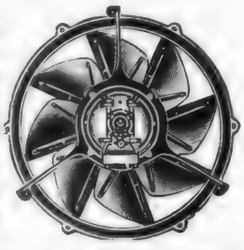
DAMPER FULLY ADJUSTABLE BY ONE BOLT WITH POSITIVE LOCK

ÆOLUS DICKINSON CO.
3336-44 So. Artesian Ave. CHICAGO
(Some territory open for agents)

JAMES M. SEYMOUR
Established 1888
Lawrence St., Mechanic St. and Kirk Place, NEWARK, NEW JERSEY

AUDITORIUM FANS, 36" to 120" to fit any square opening. SEYMOUR FANS sold subject to substantial discount. Furnished with suitable pulley or coupling for direct connection TWIN FANS include shafting and center bearing.

Special Fans for Cooling Towers, Heating Systems, Induced Draft, Forced Draft, Dry Rooms, Dry Kilns.



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Engineers: Before You Specify! Investigate Duro Feather Weight Wafer

DURO AIR FILTER COMPANY 3151 SHIELDS AVE. Chicago

Insist On

VENTURAFIN

Trade Mark

METHOD OF UNIT HEATING

THE revolutionary method of proved dependability that **forces** heat—as much as you want—where you want it—cheaper to buy—cheaper to install—cheaper to maintain—with five times the efficiency of ordinary heating methods.

AMERICAN BLOWER COMPANY, DETROIT, MICH.
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONT.

(575)

American Blower

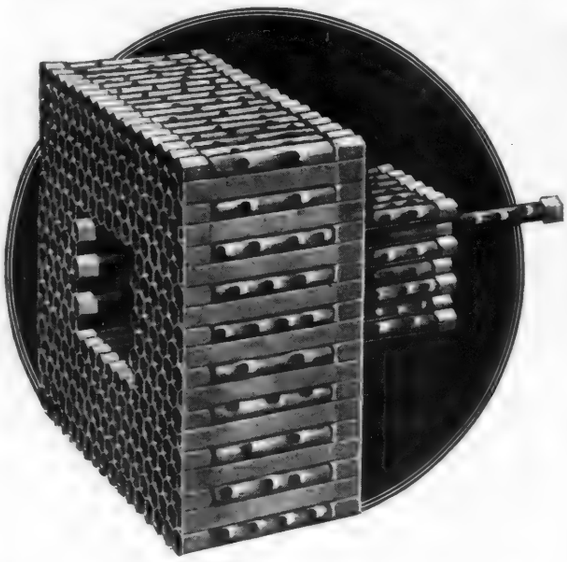
"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

✓ HEAT WITH UNIT HEATERS

Ask your heating contractor for prices—if he does not handle the Venturafin Method of Heating, write us for one who does.

Johnson Unit Heaters



The Secret of ECONOMY

THE economy of any steam heating system depends, largely, upon its ability to condense steam and to distribute the heat units that are liberated. The "cartridge type" radiator, as used in Johnson Unit Heaters, not only allows the passage of greater volumes of air, permitting better absorption of heat units and wider distribution, but it still further speeds up condensation because of the great area of the thin, pure copper walls.

The Johnson Unit Heater *puts every heat unit to work.*

Send for our "Unit Heater Catalog."

JOHNSON UNIT HEATERS are made in a wide range of sizes and three different styles. The Propeller Fan Type is made for both suspension and floor stand types, with or without deflecting vanes. The Blower Type for suspension can be furnished with or without deflecting vanes.

"Heat with Unit Heaters"

Johnson Fan & Blower Co.
MANUFACTURERS OF FANS & BLOWERS FOR ALL PURPOSES
1325 W. Lake St. - - - Chicago, Ill.
Offices In Principal Cities

Johnson Unit Heaters

MUELLER
· Direct-Fired ·
Forced Air Unit

for Industrial Heating

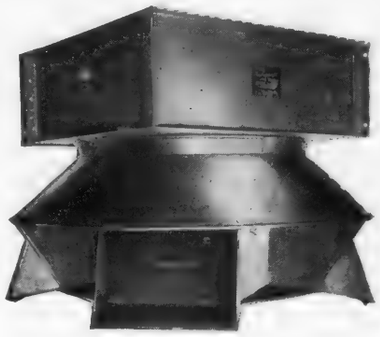
COMPARED to elaborate steam systems it is more economical in first cost and maintenance, more quickly responsive and subject to direct control. Has the additional advantage of ventilating while it heats. For heating Factories, Foundries, Large Buildings, Offices, etc., the Mueller Direct Fired Forced Air Unit Heater has these advantages:

1. Direct fired unit. No danger of freezing, breakages or shut-downs.
2. Mueller Double Radiator self-cleaning furnace with extra large area of direct heating surface and scientifically proportioned humidifier.
3. You don't need a licensed engineer to run it.
4. May be installed in space to be heated, in single units or batteries, or in adjoining room, conveying warm, moist air through ducts.
5. Automatic electric fan maintains a constant pressure on heater, delivering a large volume of air at a satisfactory temperature.
6. May be used for ventilation, using outdoor air instead of recirculating heated inside air.
7. Reversible cowl equipped with two warm air outlets, mounted on pivot collar, allows introduction of air into room at any desired angle.

Write for descriptive literature and let our engineering department confer with you regarding your heating requirements.

L. J. MUELLER FURNACE CO.
Established 1857
267 Reed Street Milwaukee, Wisconsin
Heating Systems of All Types
BRANCH OFFICES
Chicago, Detroit, St. Louis, St. Paul, Minneapolis, Fort Collins, Colo., Salt Lake City, Seattle, Baltimore.

Swing In Line with Progress!



PROGRESS demands shaking off ancient ideas. Progress in heating industrial buildings demands using resultful, low-cost methods. Progress demands heating with Unit Heaters. Line up with Progress!

Wing *Featherweight* Unit Heaters

Low Ceiling Type Wing Featherweight Unit Heaters installed in Somerville Stove Works, Somerville, N. J. Seven Wing Heaters.

High Ceiling Type Wing Featherweight Unit Heaters in Machine Shop of Chicago, Milwaukee & St. Paul R.R., St. Paul, Minn.

Two of the four Wing Featherweight Unit Heaters, Horizontal Type, installed in Shipping Department of Montgomery Ward Co.

The Wing idea is simple. *It puts heat where it is wanted!* That is, at the working level. It prevents the accumulation of a bank of overheated air at the ceiling where it serves no useful purpose.

Wing Featherweight Unit Heaters are located at or near the ceiling. They take the air from the overhead spaces, heat it while it is passing through the small copper tubes which are surrounded by steam. The heated air is then forced to the working floor, warming it comfortably and uniformly. Here the air loses some of its heat, then it rises ceilingwards, goes through the Featherweight Unit Heaters again and is recirculated to the floor. This, in brief, is the story of Wing heating.

Its logic is shown by results. Cost of heating immediately goes down—naturally, since Wing units heat the floor, not the overhead spaces. Installation is done with ease and despatch,—steam lines overhead; no costly pipe trenches, and no sub-grade boiler rooms.

How well Wing heating logic has taken the trade, is shown by the enthusiasm of everyone who has ever put in a Wing installation; and its success is proved by the hundreds of satisfied Wing users, and their continual repeat orders for Wing units.

Write for Bulletin H-2

L. J. Wing Mfg. Co.

Hudson and 13th Streets
New York City

HEAT with Unit Heaters!

De Bothezat Disc Pressure Fans

Once again show their SUPREMACY *when operating* against resistance, with a substantial reduction in operating costs.

Substituted for blowers in three paper drying rooms; each room equipped with one 24" DE BOTHEZAT DISC PRESSURE FAN, for supplying and recirculating tempered air through a heating coil and a distribution of ducts and one 18" DE BOTHEZAT DISC PRESSURE FAN, for exhausting excessive moist air from room through ducts. Total motor horsepower required, *two-thirds*. This as compared with 3 H.P. operating blowers in original drying room.

Consider the power saving factor! Also, the difference in cost of equipment and installation.

Look for the fan with the 32 blades.

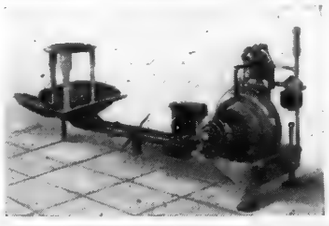
De Bothezat Disc Pressure Fans for Positive Results.

Catalog "HV" upon request

De Bothezat Impeller Co.
Incorporated
1922 Park Ave. **New York City**

The CHALMERS OIL BURNER

was among the pioneers in the oil burner industry and their present popularity is based onthe permanent, satisfactory service they have delivered through the years.



Approved by Underwriters Laboratories. Responsible Representatives will find the Chalmers Agency a profitable one.

CHALMERS OIL BURNER CO.
Minneapolis, Minn.
Member American Oil Burner Association.

For Heating and Ventilating Engineers!

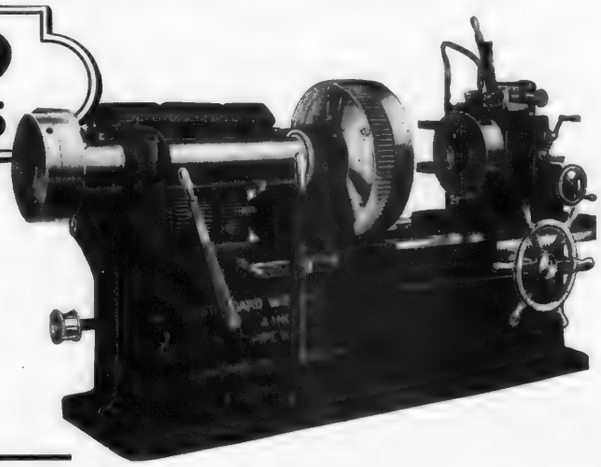
This is ATLAS Jr. No. 21. The only difference between this and the first edition is that Edition No. 2 includes our new Campbell Feed Water Regulator.
If you have no copy whatever and are interested in reducing valves, damper regulators, temperature regulators, float valves, etc., you should by all means have one.

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE
281 South St., Newark, N. J.

STANDARD PIPE THREADING MACHINES

They're made for the tough jobs—the harder they come the better Standard Wieland likes them.

Standard's unusually wide chasers—insuring extra long, clean cuts—sturdy construction, and marked absence of confusing parts—are features that will appeal to you. Let us send you the facts.



STANDARD ENGINEERING COMPANY
ELLWOOD CITY, PENNA.

On scaffold ready to connect.

Two men do the entire job.

Completely installed in 30 minutes.

A New Era in Heating Installation and Efficiency

MODINE Unit Heater marks a new era in heating installation and efficiency that is revolutionary in its application. Complete installation is made in 30 minutes. The unit suspends from the overhead steam or hot water line at any discharge level desired. A length of pipe and a union represents all of the material needed. Less than 4½ cubic feet of space occupied. Tons of dead weight are replaced by pounds. The Modine Unit weighing 125 pounds equals the heating capacity of 700 square feet of direct radiation. Delivers 2000 cubic feet of heated air per minute in any direction. At 60 degrees room temperature, the B. T. U. discharge is 163,000 per hour.

Write for Bulletin "A" which contains all of the facts relating to this revolutionary heating.

MODINE MANUFACTURING COMPANY
HEATING DIVISION ThermModine RACINE, WISCONSIN
Chicago Sales Office, 720 Cass St., Chicago, Ill.

MODINE
UNIT HEATER
FOR STEAM OR HOT WATER HEATING SYSTEMS

The illustration shows how simple it is to DIRECT THE HEAT from the Modine Unit Heater WHERE NEEDED —toward a bad door or window, lathe, work benches, etc. One man with a wrench does it in a few minutes' time.

TWINFAN Unit Heaters

Keep Your Heat Where You Want It

No satisfactory reason has yet been advanced why a man should keep the temperature at the ceiling of his factory or garage 25 to 40 degrees warmer than at eye-level. His men don't work near the ceiling; they stand on the floor. Heat which rises to the ceiling is sheer waste.

When you use the direct radiation system, any attempt to keep floor temperatures fairly comfortable shoots the heating cost skyward. If you try to keep the cost down, your men get uncomfortably cold.

TwinFan Unit Heaters take you out of this dilemma. You can have plenty of heat at low cost. *TwinFans* suck the cold air off the floor, heat it and blow it to all parts of your building. There is little or no loss through overheating the ceiling.

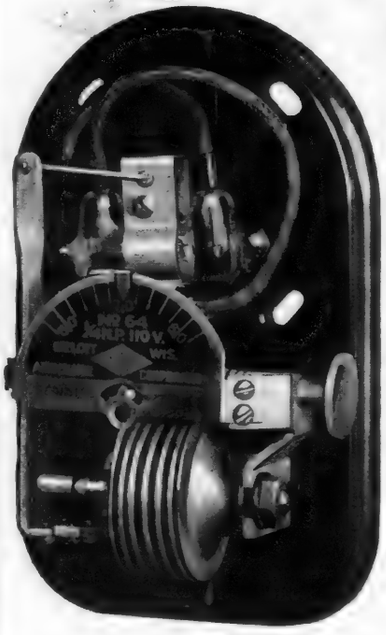
TwinFans are year 'round units. Instant heat-control makes them invaluable during seasons of sudden temperature changes. They make first-class ventilating coolers in summer.

"Heat with Unit Heaters"

One sale of Dwyer TWINFAN Unit Heaters begets another. The satisfaction experienced by users of TWINFANS is a guarantee of a steadily increasing business. Let TWINFAN heating experts co-operate with you on your next heating job.

DWYER EQUIPMENT COMPANY
4534 W. NORTH AVE. CHICAGO, ILL.

CON-TAC-TOR THERMO-SWITCH



Practical
Simple
Safe

High Voltage—Switches Motor without Relay.

For
Oil Burners
Unit Heaters
Forced Draft
Coal Burners
Etc.

A complete line of Automatic High Voltage Controls listed in Bulletin HO-7

ABSOLUTE CON-TAC-TOR CORPORATION
ELKHART, INDIANA

Vapor Heating

assurance doubly sure when tied to the boiler with a

Wiley Safety Vent Vapor Regulator

Write for your copy of booklet describing the Wiley line of vapor heating specialties.

peerless quality product manufactured and sold exclusively by

The Simplex Heating Specialty Co.
(INC.)
Lynchburg, - Va.

Clean, inexpensive heat
Easy to Install and Control

The trend of modern industry to unit heaters is based on a number of outstanding advantages:

Clean, warm air without dust.

Light in weight—1/10 to ¼ the weight of ordinary types.

Easy to install—can be fastened to wall or ceiling, requiring no floor space.

High radiation rate—copper-finned brass steam coils multiply the effective radiating surfaces by many times.

"HEAT WITH UNIT HEATERS"

Economical—enormous capacity for radiating and distributing heat permits heating large areas with few units. Saves steam piping and heat losses.

Construction—the fan is the "Buffalo Breezo," a propeller type, all-steel multiblade fan. The blade design is such that there is no back lash—all the air handled by the wheel passes through the heating coils and is used. The rigid, all-steel construction of brackets, fan and heater housing eliminates vibration. The large, totally enclosed motor is silent running and will operate the fan continuously if desired.

Breezo-Fin Unit Heaters give a distribution of heat remarkably uniform from floor to ceiling. In the case of very tall rooms the "Breezo-Fin" with Air Re-circulating Box, shown at the right, produces an even greater uniformity of temperature by drawing the intake air from the cooler layers near the floor.

WRITE FOR CATALOG NO. 466

Recently issued. Gives much valuable heating data.

"Buffalo"

Buffalo Forge Company

480 BROADWAY, BUFFALO, N. Y.

In Canada: CANADIAN BLOWER & FORGE CO., Ltd., Kitchener, Ont.

Breezo-Fin Unit Heaters

ACE

AIR FILTERS

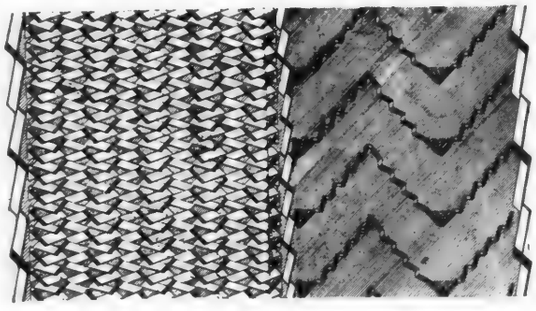
AFTER YOU HAVE read all the literature on the purification of air; after you have studied all the construction and efficiency claims of every Air Filter that has ever been designed and built—just remember that the Ace guarantee sums up in a few words what you actually get in your plant as soon as you install Ace Filters.

Guarantee

We guarantee that the Ace Filter has the highest cleaning efficiency with the lowest average resistance of any Air Filter known, regardless of type.

Proof of Guarantee

THE SERVICES OF THE ACE LABORATORY AND ENGINEERS ARE AT THE DISPOSAL OF ANY COMPANY DESIRING TO PROVE THE ACCURACY OF THE ACE GUARANTEE CITED ABOVE.



2nd Stage 1st Stage

Air Flows from Right to Left

Write us about your pure air problems—if you have any.

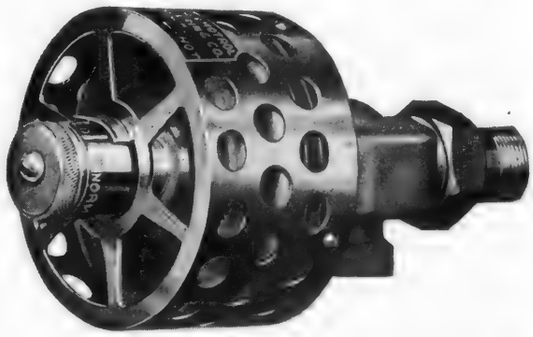
GENERAL AIR FILTERS CORPORATION

Manufacturers of

AIR PURIFICATION EQUIPMENT

110 W. 42nd STREET NEW YORK

Sterlco TRADE MARK



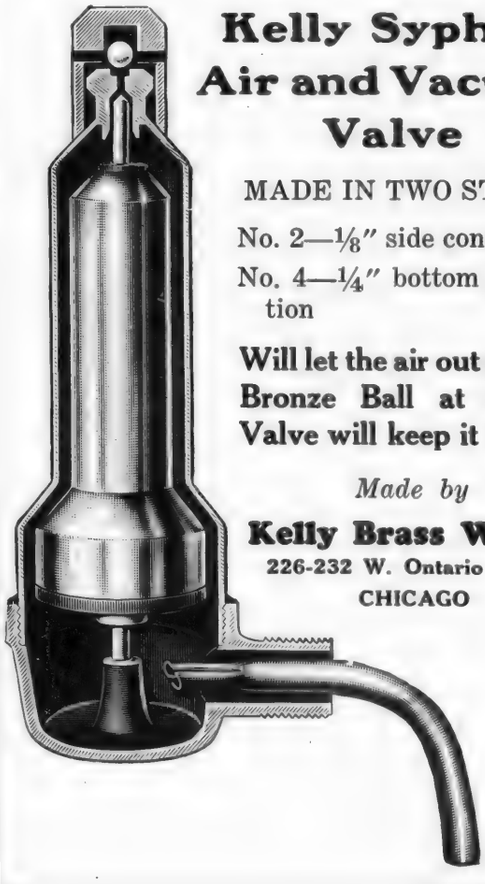
THE THERMOTROL

A self-contained temperature regulator which regulates room temperatures accurately, and is as easily installed as a radiator valve. Moderate first cost.

Write for Bulletin 38.

STERLING ENGINEERING COMPANY

1640 HOLTON ST., MILWAUKEE, WIS.



Kelly Syphon Air and Vacuum Valve

MADE IN TWO STYLES

No. 2—⅛" side connection

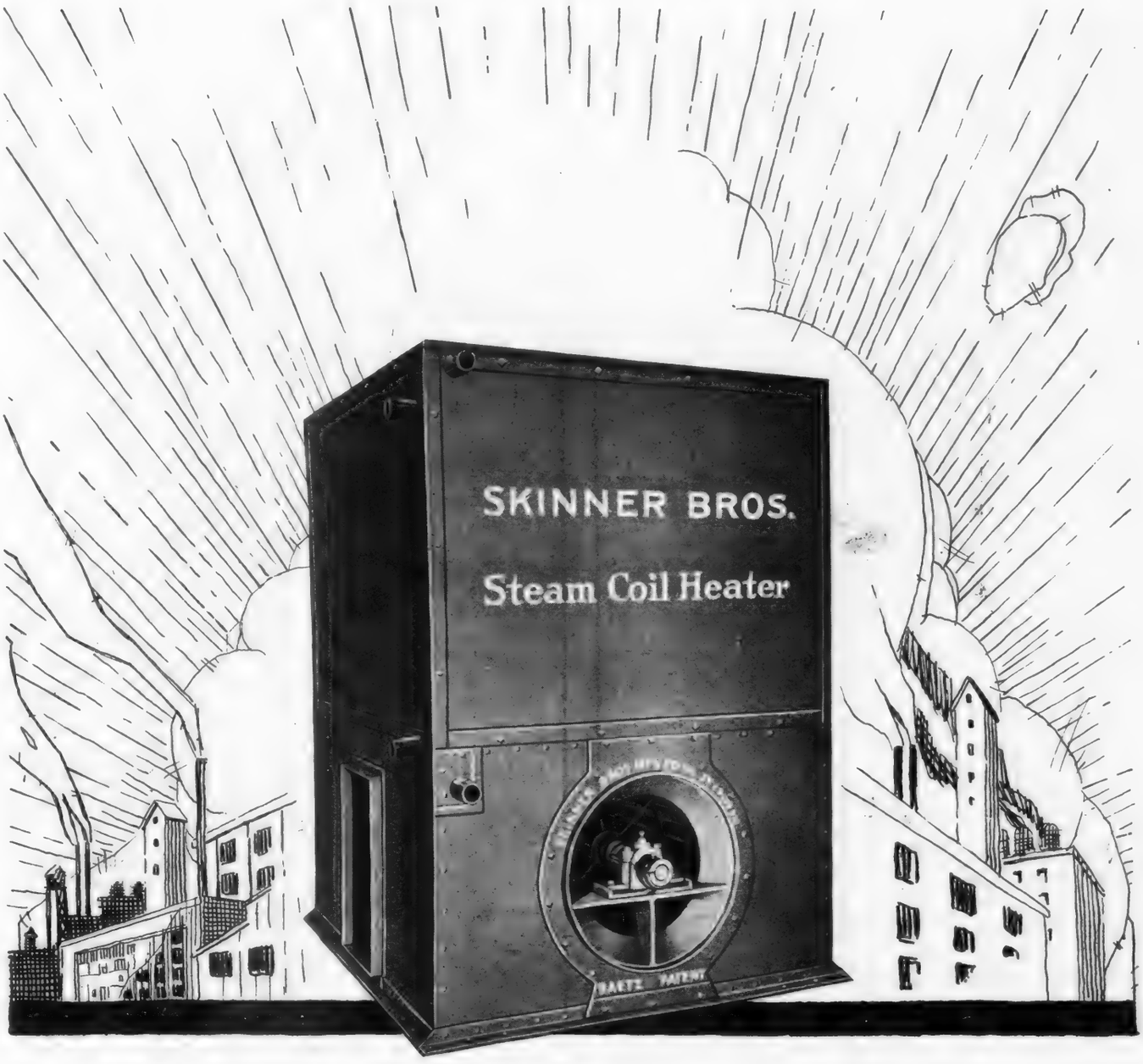
No. 4—¼" bottom connection

Will let the air out and the Bronze Ball at top of Valve will keep it out.

Made by

Kelly Brass Works

226-232 W. Ontario Street, CHICAGO



Intrenched in Industry by Years of Making Good

SKINNER BROS. STEAM COIL HEATERS have intrenched themselves in American Industry by making good. They have proved their excellence in thousands of industrial plants. Not only are they the pioneers in the unit heater field, but they are the only heaters that contain all the improvements of the original patentee.

The modern industrial building, whether of permanent or temporary construction, saw-tooth or monitor type, single or multi story, has not been found that cannot be heated efficiently and economically with Skinner Bros. Steam Coil Heaters.

They are also the positive remedy for the steam and vapor nuisance that afflicts many industrial plants.

Skinner Bros. Steam Coil Heaters are constructed in sizes and designs to meet every modern factory requirement for dimensions and capacities.

Our Engineering Department will gladly help you plan the proper equipment. No obligations will be incurred.

Write for catalog

SKINNER BROS. MANUFACTURING CO., Inc.

Main Office, 1404 S. Vandeventer Ave., St. Louis, Mo., 1014 Flatiron Bldg., New York

Branches & Sales Offices in principal cities. Factories in St. Louis & Elizabeth, N. J.

SPRACO AIR FILTERS

Spraco Filter Cell

Fulfill all the requirements for an ideal air cleaning device.

Cleaning efficiency is unusually high, due to the correct filter media principle.

Initial cost is low.

Installation expense is reduced to a minimum by use of the sash-like, all welded sectional framework.

Resistance is maintained constant by routine cleaning.

There are no moving parts to wear out and no power required to operate.

SPRACO Washing Tanks are equipped with a steam water heater, large drain cock and combination cover and drain rack.

The SPRACO Rotary Washing Tank, recommended for large installations, is the most effective device for washing cells with a minimum of labor.

Send for Bulletin F-81

Spray Engineering Company

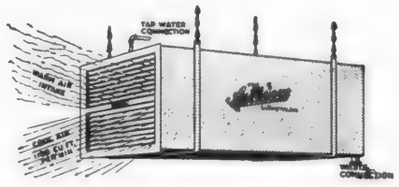
60 High Street

BOSTON, MASSACHUSETTS

Air Washers, Cooling Ponds, Spray Nozzles
Air Filters, Strainers, Flow Meters

COOL!

The Aerodore
GAMES SLAYTER SYSTEM



The Aerodore cools, washes out dust, and odors, controls humidity.

Any home, office or kitchen can be kept below 80° in the hottest weather.

Simple in construction, operated entirely by city water, no electrical or other connections necessary.

Write today for descriptive folder.

Announcing "Slayter Unit Heat"

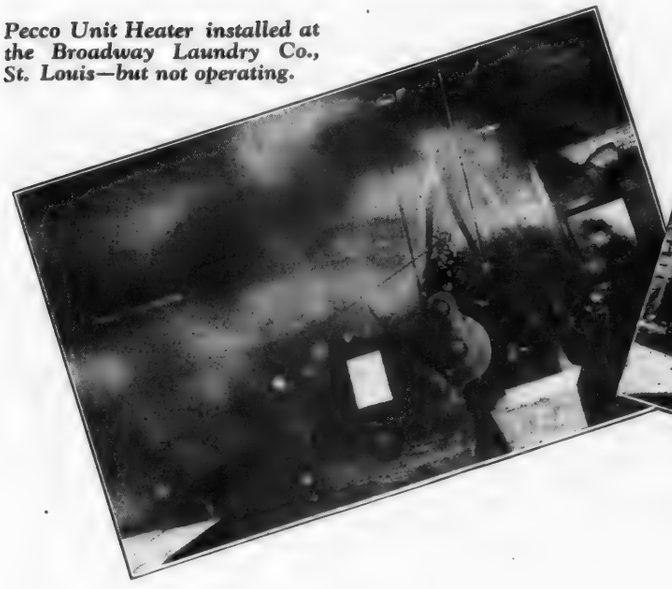
A combined Oil Burner, Warm Air Furnace, Unit, which has been under development for five years. (Inquiries solicited.)

Games Slayter

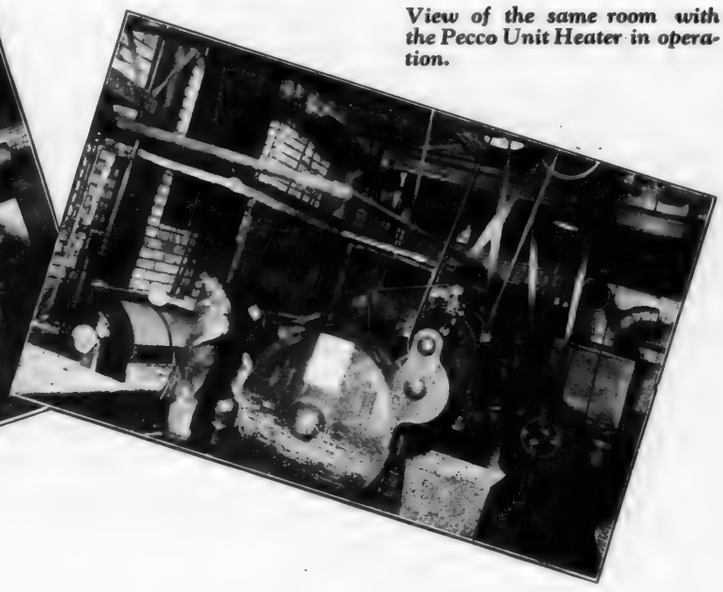
Industries

Lafayette Ind.

Pecco Unit Heater installed at the Broadway Laundry Co., St. Louis—but not operating.



View of the same room with the Pecco Unit Heater in operation.



A "Before and After" Story

The efficiency of Pecco Unit Heaters as steam removers is graphically shown by these two photographs of the installation at the Broadway Laundry Co., St. Louis.

In the Words of the Operator of this Plant

"Since installing this heater we have eliminated practically all of the steam, and not only has it improved the working conditions in this room, but we find a big improvement in the condition of our belts and pulleys because they remain practically dry now, while before installing the heater they were constantly wet, causing slipping and other troublesome conditions. We heartily endorse your heater for conditions such as ours."

Many other interesting Pecco installations are fully described in our new catalog—sent on request.

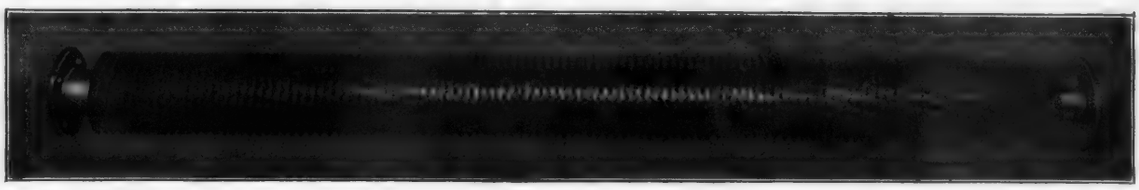
PECCO, INCORPORATED, 2980 North Market St., St. Louis, Mo.

PECCO UNIT HEATERS

"They Keep The Whole Place Warm"

Heat with Unit Heaters

Figure on finned tubes



SCHUTTE KOERTING

RADIAFIN TUBES
for heating or cooling air

have 6 to 10 times as much surface as plain tubes.

6 sizes—¾" to 3"—lengths up to 15 feet—plain or flanged ends—with or without headers.

The radial fins insure maximum heat transfer

On display in Machy. Hall at the Sesquicentennial Exposition.

SCHUTTE & KOERTING CO., 1153 Thompson St., PHILADELPHIA, PA.

Radiator Brackets

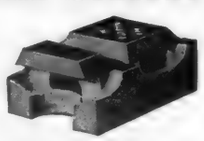
York Wrought Steel Radiator Brackets will save you money in installing radiators, for no wall strips are required. Brackets fasten with lag screws or expansion bolts, and oval bolt holes allow adjustment for leveling or pitching. They are the lowest priced brackets on the market.

Twelve sizes carried in stock. Write for catalog, prices and discount.

York Heating & Ventilating Corp.
1506 Locust Street, PHILADELPHIA

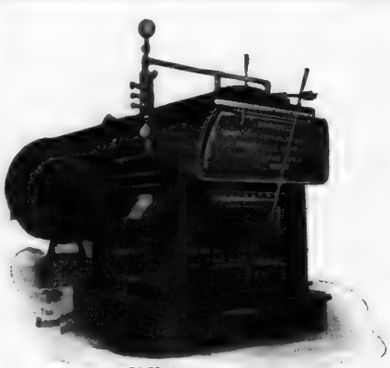
Why Use Large Domestic Coal?

You can obtain the same results at about half the price—with PYRAMID GRATES because they burn Buckwheat Coal.



Let us send full details.

PYRAMID IRON PRODUCTS CO.
136 Liberty Street New York City



Brownell Return Flue Portable Heating Boiler—Smokeless Type

BROWNELL

Better Boilers for Heating and Power Purposes
70TH YEAR

of successful manufacturing experience. This is the reason why Brownell Boilers are specified by all the leading Heating and Contracting Engineers.

BROWNELL Steel Heating Boilers are
LOW IN FIRST COST
HIGH IN EFFICIENCY
BUILT TO LAST A LIFETIME

Our reputation is your insurance of a high quality product. Let us solve your heating problems. Sales representatives in all principal cities. Send for them.

THE BROWNELL CO.
DAYTON, OHIO

THE BROWNELL COMPANY — The World Over — Since 1855 — DAYTON, OHIO, U.S.A.

Established 1855

Send for Bulletins B6 B6A

BOILERS

Buckeye Thermovent Units

Installation of Type E Thermovent, Showing Sheet-Metal Ducts for Air Distribution

Putting the Warm Air Where It Belongs

Instead of letting the heated air pile up at the ceiling and accumulate at a high temperature in order to heat the lower level of a room comfortably, the THERMOVENT blows its heated air downward with sufficient force to reach the floor, thereby heating the part of the room that is occupied, which is where the warm air belongs. This even distribution of the warm air obviates necessity of excessive heating to overcome the cold spots.

Being a ceiling mounted unit, its position is not only advantageous from a standpoint of efficient air diffusion, but is economical in the saving of valuable floor or wall space. Extremely compact and quiet in operation, and successfully disposes of many otherwise bothersome problems of heating and ventilating installations. THERMOVENT is particularly suited for heating and ventilating factories, garages and other industrial buildings as well as churches, theatres, auditoriums, gymnasiums and similar assembly rooms.

Send for our catalog fully describing the THERMOVENT UNIT and its advantages.

A Few of the Advantages

Low first Cost

Can be installed at from twenty to forty percent lower than direct radiation system because Thermovent eliminates the cost of valves, piping, traps, radiators, etc. Where ventilation is desired, it replaces system of direct radiation and large ventilating fans.

Ease of Installation

Easily installed, as it is shipped completely assembled ready for mounting. When in position only steam and electrical connections are necessary.

Small Space Required

Thermovent heights vary from 18" to 34" and depths from 38" to 55", and widths from 40" to 60", depending on requirements. Regularly designed for ceiling suspension, saving valuable floor space. Can be furnished for floor or other mountings.

Economical Operating Expense and Maintenance

Costs less to operate than direct radiation because all of the heat is utilized. Can be operated by manual or automatic control, giving intermittent or continuous service. Only two points in Thermovent require attention; namely, two motor bearings readily accessible for occasional oiling.

Effective Air Distribution and Diffusion

Has sufficient velocity to thoroughly diffuse the air and distribute it without objectionable drafts. Actual tests have shown maximum variation between floor and ceiling temperatures of average room less than ten percent.

Ease of Control

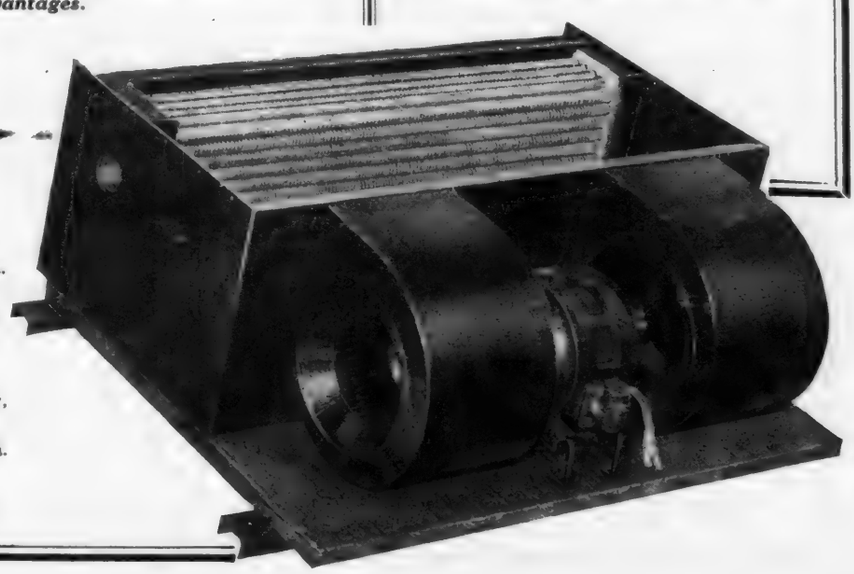
Motor can be started and stopped at will, manually or automatically. Some types provided with both by-pass and mixing dampers, manual or automatic control, permitting regulation and maintenance of room temperatures.

THE BUCKEYE BLOWER CO.

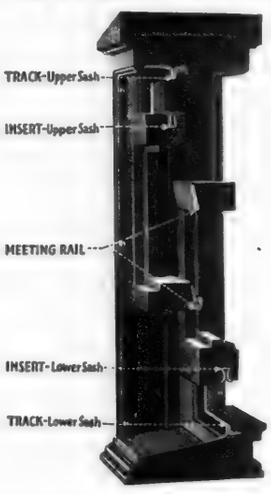
Columbus, Ohio

BRANCH OFFICES:

216 Bona Allen Bldg., Atlanta, Ga.
2126 Edmondson Ave., Baltimore, Md.
2017 Fourth Ave., North, Birmingham, Ala.
321 Jackson Building, Buffalo, N. Y.
301 Rose Building, Cleveland, Ohio.
401 Transportation Building, Chicago, Ill.
3115 No. Central Ave., Indianapolis, Ind.
1226 California St., Denver, Colo.
400 Penobscot Bldg., Detroit, Mich.
1400 Broadway, New York, N. Y.
1011 Pioneer Trust Co. Bldg., Kansas City, Mo.
321 Bulletin Building, Philadelphia, Pa.
709 Columbia Bank Bldg., Pittsburgh, Pa.
210 Dooly Bldg., Salt Lake City, Utah.
Fales Building, Seattle, Wash.
226 Kirk Ave., Syracuse, N. Y.
1101 Realty Building, Youngstown, Ohio.



HIGGIN
ALL METAL
WEATHER STRIPS



The patent *Insert* strip makes Higgin Weatherstrips extra draft-tight

Higgin Weatherstrips are the only all-metal strips with the self-holding spring flange **Insert** in the sash. This **Insert** is important.

It makes a perfectly draft-tight contact at every point. Swelling or warping cannot prevent accurate fit and closure.

Without the Higgin Metal Insert the wooden groove will wear, swell or shrink, causing sticking or allowing seepage of air through the apertures.

Higgin Strips are "Metal against metal all the way round." Higgin-equipped windows and doors always keep cold air out and warm air in, operate smoothly and easily, and never need refitting.

HEATING ENGINEERS! You can safely guarantee a definite heating efficiency for your equipment when Higgin All-Metal Weatherstrips are installed. They keep all the cold air out and all the warm air in. They never lose their close fit by warping or shrinkage of frames. Every job is installed by trained Higgin men and guaranteed by the Higgin organization. Recommend Higgin All-Metal Weatherstrips to your customers.

The HIGGIN Mfg. Co.
Newport, Ky.
Toronto, Canada.

Manufacturers of Higgin All-Metal Weatherstrips and Higgin All-Metal Screens

Hell Gate Uses Tangldust

An installation of Tangldust air filters in the Hell Gate Station of the United Electric Light & Power Company, New York, Thomas E. Murray, Inc., Engineers.

Clean Air in Power Plants

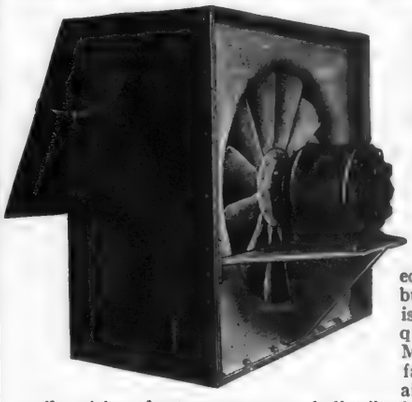
Clean air for power and industrial plants is as essential as for general ventilation purposes. Destructive dust and dirt injure expensive equipment, retard production and menace the health and comfort of workers.

Tangldust air filters, with their exclusive two-stage type of construction and renewable oil pad at the top of each filter cell, are proving to be the most efficient and economical type of air filter for general and electrical ventilation, air compressors and internal combustion engines, dust recovering, drying operations and bacteria control.

See our exhibit at the New York Power Show, Booth 523. Send for a copy of descriptive booklet H-11 "Eliminating Dust and Dirt with Tangldust Air Filters."

TANG L DUST AIR FILTERS
TRADE MARK REGISTERED
MADE BY THE COOLING TOWER COMPANY, INC.-15 JOHN STREET, NEW YORK

COMET
UNIT-HEATERS



More Heat—One-fifth the Weight

For efficient and economical heating in buildings where steam is used; easily and quickly installed. Motor driven disc fan forces the cold air through heating coil, raising the temperature and distributing it into the room. A splendid application for replacing air used by the draft of boilers. The warm air leaving the Unit Heater at high velocity gives even distribution. Quantity of air and direction of flow adjustable. Even temperature can be maintained in all parts of the building.

Write for bulletin 85 which describes fully.

Fans
Unit Heaters
Air Washers
Blowers
Furnaces

NEW YORK BLOWER COMPANY

General Offices
2242
So. Halsted
Chicago

Another Notable Ilg Unit Heater Installation *the Champion Coated Paper Co.*

Very Satisfactory

Says Vice President W. D. Randall

"IN our new coating mill finishing room extension, which is some 255 feet x 600 feet, we depend entirely for heating on the ILG Unit Heaters, and although the single story, sawtooth roof with a great expanse of glass would make a rather severe condition to heat satisfactorily during the cold weather experienced last winter, the ILG Heaters have taken care of the situation in such manner that on the coldest days this large room has always been heated to a comfortable temperature." — *W. D. Randall, Vice-President, Champion Coated Paper Company.*

The heating equipment used in the building mentioned above and in various other buildings at the Champion Plant is:

24 ILGAIR Unit Heaters, Size 10003
6 ILGAIR Unit Heaters, Size 5003
1 ILGAIR Unit Heater, Size 7003
2 ILGAIR Unit Heaters, Size 3003
1 ILGAIR Unit Heater, Size 2003

Write for new Illustrated Bulletin regarding Ilgair Unit Heaters.

HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINE

Unit Heaters

"Heat with Unit Heaters"

ILG ELECTRIC VENTILATING CO.
2858 NORTH CRAWFORD AVE. CHICAGO ILL.

GRAHAM PAPER CO.,
ST. LOUIS, MO.

Equipped with
ELECTROZONE VENTILATION

ELECTROZONE Ventilating System insures highest efficiency for office employees and industrial workers. This equipment sells itself solidly to the management.

The moderate first cost and very low operating expense doubles the owners' appreciation of the Engineers' work.

Manufacturing exclusively—ELECTROZONE Ventilating Ozonators, ELECTROZONE Furnace Ozonators, ELECTROZONE Portable Ozonators, ELECTROZONE Water Sterilizers, ELECTROZONE Industrial Ozonators.

The Air Conditioning and Engineering Company,

Main Office and Factory: 2914 South Jefferson Avenue, St. Louis, Mo.

AUTOMATIC
HEAT REGULATION
ELECTRICALLY OPERATED

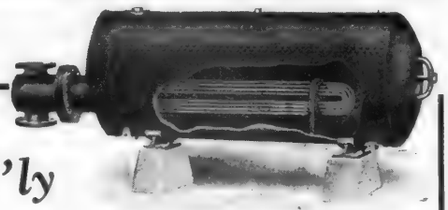
Packless Electric Valve

Thermostat

Whether it be for an isolated room or complete building, Gold's Control will give you that desired equable temperature. Energy derived from the 110 volt lighting current.

Write for General Catalog with Testimonials

GOLD CAR HEATING & LIGHTING CO.
BUSH TERMINAL
220 36th STREET BROOKLYN, N. Y.

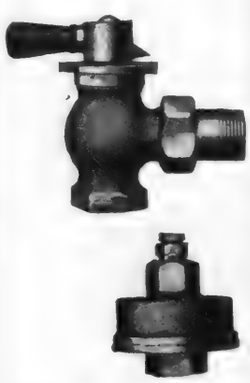


"Frank"ly

is the way in which O.E.F. U-Tube and Straight Tube heaters are offered because they are efficient and thoroughly dependable. Made of flanged steel throughout. The heavy gauge seamless drawn copper tubes are expanded into rolled tube sheets.

Write us for full details.

O. E. Frank Heater & Engineering Co., Inc.
Factory and Offices at Buffalo, N. Y.

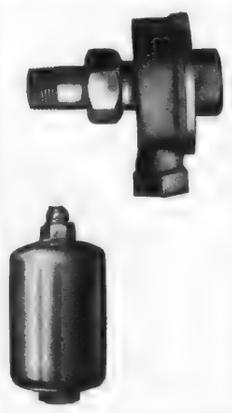


A Dependable Line of Heating Specialties

Stay-Rite Heating Specialties are dependable because they are made right and in strict accordance with heating requirements. They have long since passed the experimental stage. And over many heating seasons they have justified the confidence of their owners and proved the high efficiency of the Stay-Rite Line.

Write for literature and prices.

The Ideal Heating Equipment Co.
1250 West 4th Street CLEVELAND, OHIO



Heat With Unit Heaters

Quicker and more uniform diffusion of heat. ¶ Better control of room temperature. Room can be heated quickly by starting the motors. If too warm, heating can be suspended quickly by stopping the motors. No waste of heat when not needed. ¶ Big saving of floor, ceiling and wall space; better appearance. ¶ No waste. Unit heating is faster, and far more uniformly distributed, yet it causes no extra drain on the boiler. No more heat units are required; no more coal; no extra expense. ¶ Lower first cost. Less expensive steam piping. Easier installation. ¶ Can be installed in old buildings as readily as in new ones. ¶ Automatic control of room temperature can be provided by means of a thermostat (extra equipment), which shuts off the heat by stopping the motor and turns it on by starting the motor. Maximum heating effect is secured by means of a specially designed radiator—obtainable only in Peerless Industrial Units. ¶ Cost of electric current for the motor is negligible. ¶ Where special provision for ventilation is desirable, the necessary extra equipment can be furnished as required—wall boxes or ducts for bringing in fresh air from out-of-doors; mixing dampers for regulating the volume of ventilation; etc. ¶ A deflector can be added as extra equipment when wanted, to change the direction of air flow from the Unit. ¶ Peerless Industrial Heating Units are built by the *pioneers in unit ventilation*, in the same plant that turns out the well-known Peer-Vent Unit System of Heating and Ventilating. Heating - ventilating units built by this Company twelve years ago are still giving trouble-free service year after year.

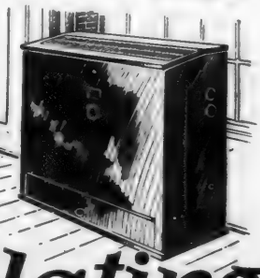
Write for literature about Peerless Industrial Heating Units.
We will gladly send our local representative, if you wish.

PEERLESS UNIT VENTILATION CO., INC.

Skillman Avenue and Hulst Street, Long Island City, N. Y.

CHICAGO 808 Monadnock Bldg.	PITTSBURGH 301 House Building	DES MOINES 520 Securities Bldg.	BOSTON 100 Boylston St.	PORTLAND, ORE. 927 Board of Trade Bldg.
SPRINGFIELD, MASS. 196 Worthington St.	CLEVELAND 1836 Euclid Avenue	DETROIT 723 Lafayette Bldg.	MINNEAPOLIS 240 Seventh Ave., S.	TORONTO, CANADA Darling Bros., Ltd., 77 York St.

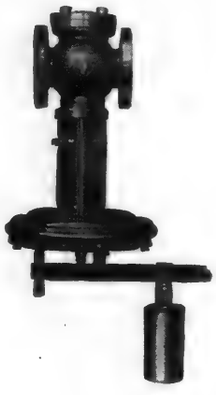
PEERLESS



UNIT SYSTEM

Heating and Ventilating

"We'll put a Mason Regulator on that Job"



Mason No. 236

The Mason Lever Style Reducing Valve is simple, positive and dependable. It is made for reduced pressure from 0 to 10 pounds, and from 5 to 25 pounds. It will give you years of accurate performance.

"Don't let any pressure control problem bother you. No matter what we're up against, we're sure to find a Mason Regulator that'll do the trick."

Whatever the service or the conditions of installation there is a Mason Regulator that will meet them dependably, accurately, economically.

For forty-three years Mason engineers have concentrated on the development of efficient pressure control systems for every power and process need. You can accept their recommendations with the assurance that the Mason Regulator for the job will give you a lastingly accurate service that means real economy.

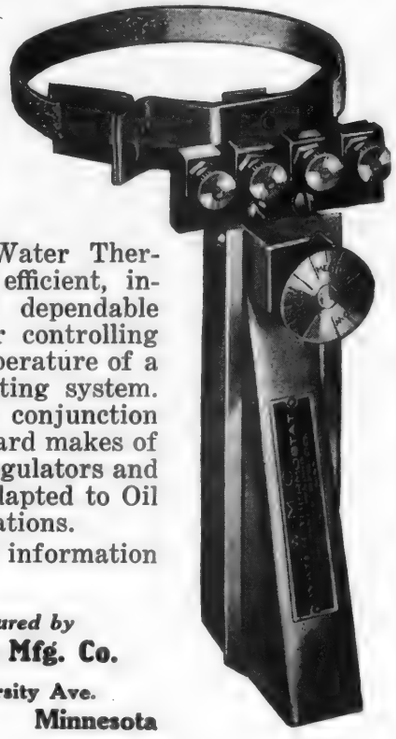
Write for handy but comprehensive Pocket Catalog 62.

259

Mason Regulators
MASON REGULATOR CO.
Boston, Mass.

W-M-C Water Thermostat
For Dual Control

Clamps on the Riser



The W-M-C Water Thermostat is an efficient, inexpensive and dependable instrument for controlling the water temperature of a hot water heating system. It operates in conjunction with the standard makes of electric heat regulators and is especially adapted to Oil Burner installations.
Write for full information and prices.

Manufactured by
The White Mfg. Co.
2362 University Ave.
St. Paul, Minnesota

Equally Dependable
for STEAM, WATER, GAS, OIL or AIR

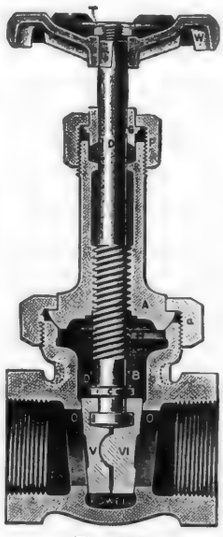


Fig. 375

POWELL White Star Gate Valves

Double Wedge Powellium Nickel Discs.

Union Bonnet

For 200 pounds, Extra heavy for 300 pounds W.S.P.

Order from your dealer
Write us for information

THE WM. POWELL CO.
Dependable Engineering Appliances
CINCINNATI OHIO

NEW HOME of the
Universal Heating and Ventilating Unit

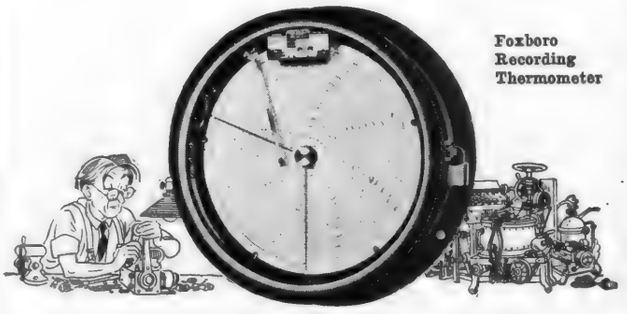
Located at
STATE ROAD AND RHAWN STREET, HOLMESBURG JUNCTION, PHILADELPHIA

This new building is the largest plant devoted exclusively to the manufacture of heating and ventilating units.

Nation-wide sales and service through offices of the American Blower Company in all principal cities.

The Universal Unit
The Standard by which all other makes are measured
REG. U. S. PAT. OFFICE

JOHN J. NESBITT, INC.
STATE ROAD AND RHAWN STREET
HOLMESBURG JUNCTION, PHILADELPHIA



Foxboro
Recording
Thermometer

Simplicity IS Efficiency

THE patent office is full of the impractical dreams of long-haired inventors. For every successful machine in use today there are scores of complicated models which could not stand the acid test of service.

Simplicity marks the winners.

Take the actuating movement of a Foxboro Recording Instrument. Here is strength with the least weight and smallest number of moving parts. Excess friction, lost motion, inertia and momentum have been eliminated.

It is the simplest, most accurate, trouble-proof actuating movement ever developed.

Or the Round Form Case introduced seventeen years ago. The Suspended Pen Arm. The Three-Point Support Clock Movement. The friction-type, accurately centered Chart-Holder. Each the simplest, most efficient design possible.

These features have made Foxboro Temperature, Pressure, Humidity and Flow Instruments standard equipment in the majority of modern office buildings, hospitals, hotels and public institutions.

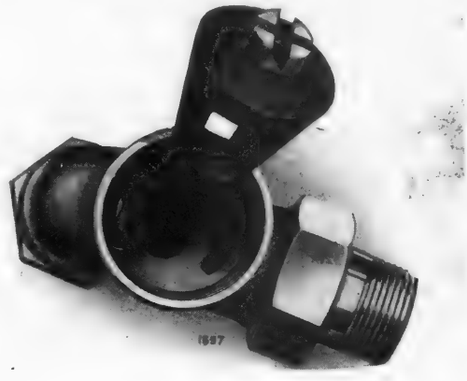
They make it possible to guarantee every Foxboro Instrument to be permanent in calibration and accurate to within less than 1 per cent of total scale range. Write for Bulletins.

THE FOXBORO CO., INC.
Neponset Ave., Foxboro, Mass., U.S.A.

New York Chicago Boston Philadelphia Pittsburgh
Cleveland Rochester Tulsa Atlanta
Los Angeles San Francisco Portland, Ore.

FOXBORO
REG. U. S. PAT. OFF.
THE COMPASS OF INDUSTRY

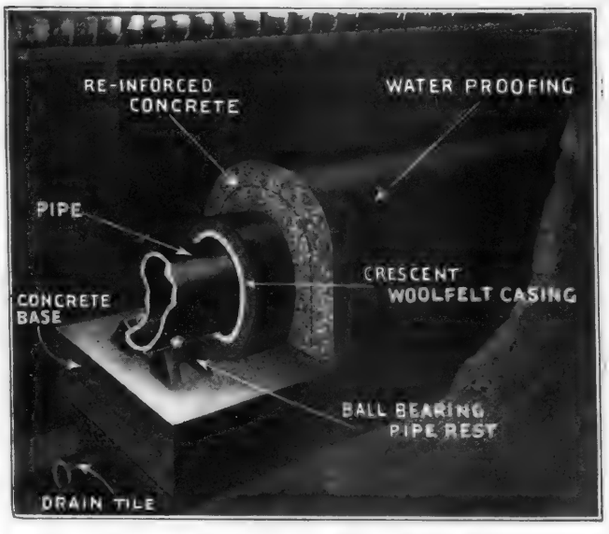
The GORTON
QUARTER TURN
Packing Lock
VALVE



The Heart of *the* Valve

Send for full details of Construction.

Gorton & Lidgerwood Co.
96 Liberty Street, New York, N. Y.
Established 1887. Representatives in Principal Cities.



THE CRESCENT SYSTEM

Dirt-Proof Ball Bearings, and Air Space Around Pipe, Permits Rotation of the Pipe, Adding Years to its Life.

Manufacturers and Contractors of
UNDERGROUND STEAM DISTRIBUTING SYSTEMS
TUNNEL OR CONDUIT CONSTRUCTION

"We solicit your correspondence"

W. H. PEARCE & CO.
115 S. Dearborn Street
CHICAGO

Catalog on Request

Reed *Clean* Air *for* Mosque Theatre

The Salaam Temple, Newark, N. J., which houses the Mosque Theatre in which a battery of Reed Air Filters is cleaning 134,400 cubic feet of air each minute. Baechlin-Backoff-Grad, Architects. T. B. Cryer Co., Newark, Consulting Engineers.

Some Well-Known Theatres Now Using Reed Air Filters:

Cass Theatre, *Detroit*; Jackson Park Theatre, *Chicago*; Keith-Albee Theatre, *Columbus*; Keith-Palace Theatre, *Youngstown*; Strand Theatre, *Pittsburgh*; University Theatre, *Chicago*.

The two micro-photographs at the left show the efficiency with which Reed Air Filters are protecting the costly interior of this theatre. Above, outside air before passing through the filters—below, 97% of all impurities removed .... Whether for theatres, clubs or office buildings, Reed Air Filters can repay their cost many times by savings in redecorating besides protecting the health and comfort of occupants .... The Reed Blue Book tells the story. Send for it today!

REED AIR FILTER COMPANY, *Incorporated*
215 Central Ave., Louisville, Kentucky — *Offices in Principal Cities*

Reed Air

TRADE MARK

filters ALL METAL

Use This

REED AIR FILTER CO., *Incorporated*, 215 Central Ave., Louisville, Kentucky
Send, without obligating me, a copy of the Reed Blue Book.

Name..... City..... Possible Use.....

Company..... State.....

EACH RADIATOR AN INDEPENDENT STEAM HEATING PLANT

Clow Combination "Gasteam" Radiators used in a variety store

Quick and Thorough Heating At Any Time

When the central heating plant is not running and heat is needed quickly, the advantages of Combination Heating are most outstanding.

Clow Gasteam Radiators provide quick and thorough heating for any room in which they are placed. When the boiler is in operation they act as ordinary radiators. But when it is shut down they are independent heating units.

When any room in the home or office becomes too cool for comfort, it takes but a few seconds to turn on the valves, strike a match, and light the Clow Radiators. In half an hour the room is thoroughly heated.

Combination Heating is both convenient and economical, because the boiler can be started a month or two later in the fall and shut down a month or two earlier in the spring.

Clow Gasteam Radiators can be furnished for either vacuum or vapor, one or two pipe systems. There are also Clow Gaswater Radiators for hot water systems.

JAMES B. CLOW & SONS

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GASTEAM — GASWATER

Anticipating the Demands on Heating and Ventilating Systems

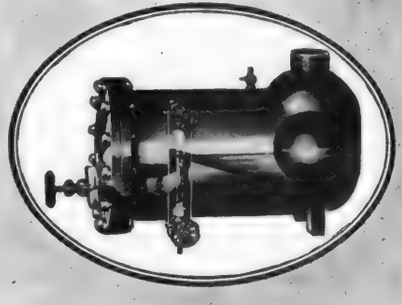
By watching the trend of out-door temperatures, it is not difficult to anticipate the demands on heating and ventilating systems.

There is no better way of knowing the Past, Present, and Future of out-door temperature conditions, than with a Bristol's Atmospheric Recording Thermometer. Install the sensitive bulb out-of-doors and mount the instrument indoors where the engineer can readily refer to it.

The Bristol Company Waterbury, Connecticut

FOR 36 YEARS MAKERS OF

BRISTOL'S RECORDING INSTRUMENTS



THE two cone valves of the Davis Steam Trap adjust themselves automatically for any rate of flow required, and are balanced, so that this trap works equally well under any pressure. Since the valves are balanced, one adjustment serves for the life of the valves; once set, they will remain accurate and tight closing until worn to the point of replacement.

Particularly useful for installations where a large reserve capacity is required in draining condensate. This Davis Trap stands up under the most difficult service conditions with typical Davis performance.

Send for the Davis catalogue and get the full description. Compare the ratings and the cost and you will see the advantages of Davis Traps.

G. M. DAVIS REGULATOR CO.

422 Milwaukee Avenue Chicago, Illinois

DAVIS VALVE SPECIALTIES

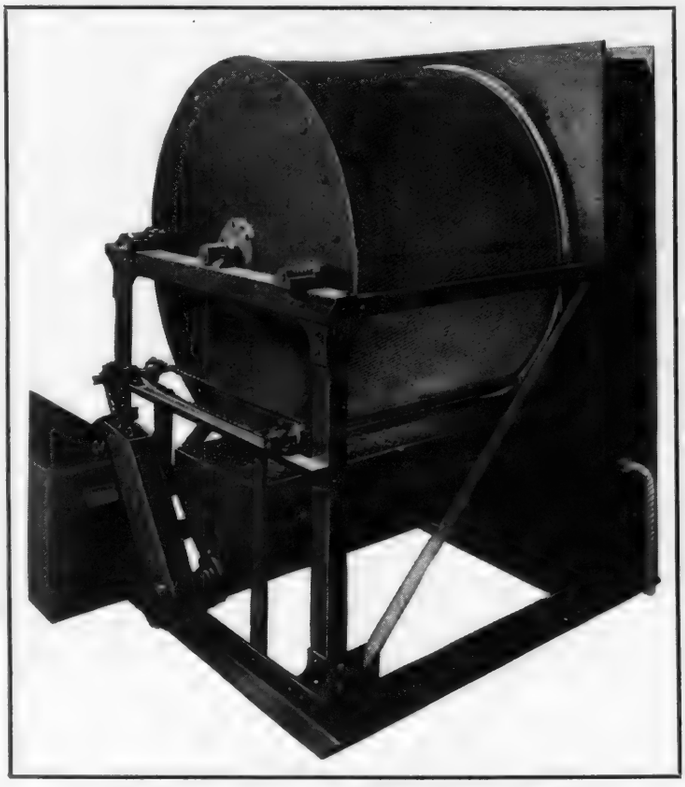
STEAM-SAVERS SINCE 1875

VALVE MAKERS FOR OVER FIFTY YEARS

The NATIONAL *ROTARY* AIR FILTER

FOR GENERAL VENTILATION

For Solving dust elimination problems in general ventilation of such buildings as are listed, or those of a similar nature, the National *Rotary* Air Filters will accomplish highly satisfactory results.



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It Cleans the Air—Then Cleans Itself.

THE National *Rotary* Air Filter is an entirely automatic device, employing the proved principle of the viscous oil coated surface, against which the air to be cleaned is impinged. The tortuous air passages are so small and multitudinous that the air stream is divided into countless tiny columns, each of which is again divided many times, being repeatedly impinged against the narrow flat surfaces of the metal ribbons, and continually caused to change direction. As the dirt or dust strikes the oil film, it is instantly saturated and held within the film, because of the oil's natural cohesiveness, leaving the air clean and pure for use in heating, ventilating, air conditioning, drying or processing.

The Automatic Sediment Ejector is the greatest advance in design since the inception of the Automatic Air Filter, since it renders operation entirely automatic, eliminating the human element altogether. The operation of the Sediment Ejector is continuous, but so slow as to be almost imperceptible. Hence, there is neither noise nor wear and the device is both durable and reliable.

In instances where space conditions are such as to make difficult the installation of a National *Rotary*, the Phoenix *Constant-Effect* Air Filter—also, completely automatic—will be found particularly adaptable. Our Air Filtration Department is at your disposal for additional advice and suggestions.

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DRYING SYSTEMS, INC.
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Drying and Baking Equipment, Compartment or Continuous
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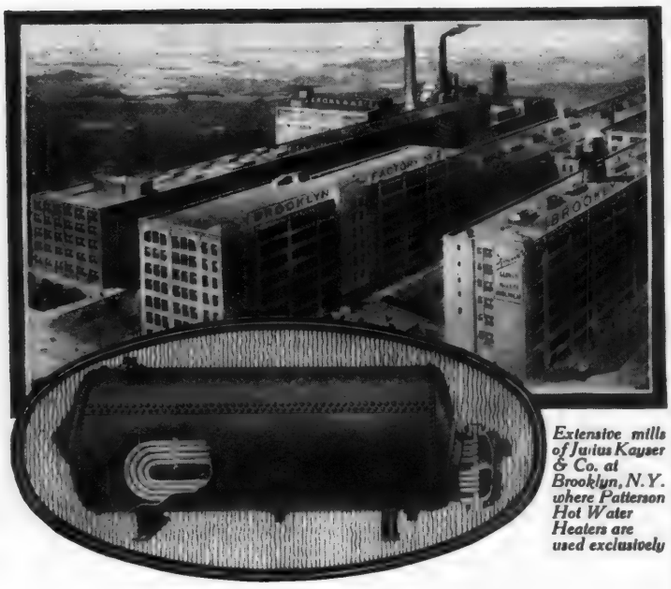

Extensive mills of Julius Kayser & Co. at Brooklyn, N.Y. where Patterson Hot Water Heaters are used exclusively

Maintaining Kayser Silkwear Quality

Another world-famous firm using Patterson Hot Water Heaters to assist them in maintaining the uniformly high quality for which their goods are noted, is the Julius Kayser Company, makers of Kayser Silkwear.

In the processing of silk in this plant, hot water bears so important a part that no chances are taken with its supply. It is a gratifying tribute to Patterson Hot Water Heaters that they were selected to help maintain the noted Kayser quality by supplying all the hot water required, as hot as required, and as fast as required.

Wherever hot water is required to produce quality products, you will generally find Patterson Hot Water Heaters in use. Heinz, Borden, National Biscuit, Swift, Postum, U. S. Rubber, and hundreds of others whose names are famous for quality products, use the Patterson.

Send for our booklet of installations.

The Patterson-Kelley Co.

107 East 40th St. New York City

Patterson
Hot Water Heaters

In Apartments

Radiators Wall-hung with **Little Giant** *Hangers*

Wall hung radiation is a feature which will appeal particularly to the housewife in selecting an apartment. Cleaning and sweeping is made very easy.

Radiators should be suspended with The Little Giant hanger—a one bolt adjustable hanger made in sizes to fit any radiator.

A new catalogue has just been prepared—ask for it.

Distributed by United States Radiator Corporation
Sold by all leading jobbers

Little Giant
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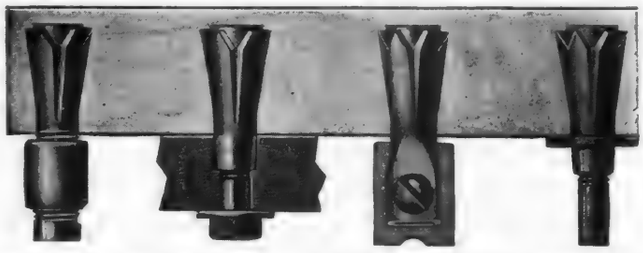
1927-31 Nicollet Ave. Minneapolis



Phillips Self-drilling Expansion Shells

For fastening all types of hangers to concrete ceilings, side-beams, columns and walls, and for bolting timbers and other equipment to concrete and stone.

Installing Self-drilling Shells in Concrete

Every shell is a drill and makes its own hole, thus eliminating drill trouble and expense.

A new sharp drill for every hole and a smaller hole per given size bolt reduces labor cost of installing to absolute minimum.

A perfect fitting hole and the enlargement of shell and hole at extreme bottom insures reliability and better workmanship.

Quickly installed with the Phillips Spring Hammer, or with special hand chucks.

Ceiling with Phillips Spring Hammer Drill

Manufactured by

PHILLIPS DRILL COMPANY

1537 Cortland Street CHICAGO, ILL.

Healthful Fresh Air

IONIZATION

(Active Oxygen)

It has long been known that there is no "chemical difference" between outside air, and the air inside of buildings.

However, there is a decided "physical difference", that is obvious to every worker in air conditioning and ventilation.

OUT OF DOORS THE SUN IONIZES AIR.

ACTIVE SUNLIGHT CANNOT PENETRATE IN-DOORS—EVEN CLEAN GLASS WINDOWS FILTER IT OUT!

HEALTHFUL, ACTIVE, INVIGORATING air may be obtained in-doors through the use of IONIZATION (active oxygen).

IONIZED AIR IS CAPABLE OF MAINTAINING ITSELF FRESH ON THE INSIDE OF BUILDINGS, EVEN IN THE DARKEST AND MOST OUT OF WAY CORNERS!

BRING THE HEALTH GIVING PRINCIPLE OF SUNLIGHT INTO ALL OF THE AIR YOU BREATHE.

Write for particulars.

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ACTIVE OXYGEN REG. U.S. PAT. OFFICE
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Division of
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Using the Mouat Heating System—

The buildings illustrated are representative of the types in which our system of heat control is used.

Mouat heating system insures the comfort and health of the inhabitants. This is important in all cases, but in a hospital it is, of course, more than usually vital. The life of the patient depends on the degree of comfort he has. Warmth is a necessity to well-being and happiness.

The Mouat System is a two pipe gravity vapor or atmospheric steam heating system, operating at from 1 to 3 ounces pressure. No pumps, return traps or mechanically operated parts.

MOUAT VAPOR HEATING CO.

Cleveland, Ohio

A Residence in Cleveland Heights, Ohio

NO FORCED DRAFT

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Breaking the Record for Low Coal Bills and Efficiency!

Low pressure steam and hot water heating boilers and tank heaters that burn No. 1 Buckwheat . . . . . No mixing with expensive coal . . . . . Magazine needs filling only once in 12 to 24 hours . . . . . No blower. No motor. No electric current. No machinery to get out of order . . . . . Twenty-one sizes . . . . . *Coal bills cut one half!*

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and Heavy Duty Tank Heater

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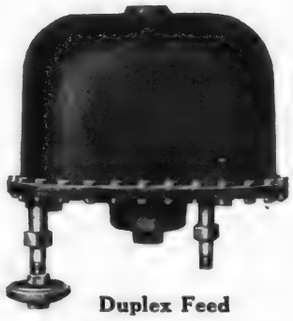
Absolute Guarantee



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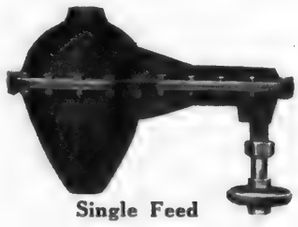

Single Feed

No Cracked Sections—
No Water Trouble—
Highest Efficiency—
Least Fuel Expense—

List Price

Single Feed:

$35.00

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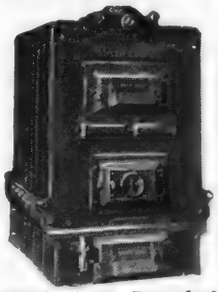
Cast-iron Water Tube
Steam and Hot Water
Heating Boilers

will give years of satisfactory Heating Service and are Fully Guaranteed

We guarantee our boilers to satisfactorily handle a load equal to 50% of the rating shown below. Piping should be included.

This guarantee is based on using bituminous high volatile coal similar to "Pittsburgh Vein" run-of-mine. Firing period four hours in zero weather.



Double Grate Down-draft "Smokeless" (Patented)

Our SMOKELESS BOILERS comply with the law and are guaranteed to pass the smoke ordinance of all cities, using bituminous coal.

The smokeless feature is fool-proof.

Expert or careful firing not necessary.

CAST IRON SECTIONAL BOILERS

100 Per Cent Water Tube Construction

36" SERIES—DOUBLE-GRATE DOWN-DRAFT, "SMOKELESS"

Water-line 48 in. if base of boiler is set in a pit 13 in. deep. Width overall 49 in. Height overall 78 in. Returns 4-2½ in.

Boiler Number, Steam	Steam Rating	Boiler Number, Water	Water Rating	Grate Area Square Feet	Grate Length Inches	No. Sections	Approximate Boiler Length Inches	Outlets—3½ in.	Smallest Dimensions Chimney Inside, In.	Height Chimney Sea Level—Feet
S-32	3800	W-32	6080	9.75	19	7	45	2	15	45
S-42	4500	W-42	7200	13.0	24	8	51	2	15	45
S-43	5200	W-43	8320	13.0	24	9	57	2	15	45
S-53	5700	W-53	9120	16.26	30	10	64	3	16	50
S-54	6400	W-54	10240	16.26	30	11	70	3	16	50
S-64	7100	W-64	11360	19.5	36	12	77	3	16	50
S-65	7800	W-65	12480	19.5	36	13	85	3	16	50
S-74	8150	W-74	13040	22.74	42	13	85	4	17	55
S-75	8500	W-75	13600	22.74	42	14	92	4	17	55
S-84	8850	W-84	14160	26 0	48	14	92	4	18	60
S-85	9200	W-85	14720	26.0	48	15	99	4	18	60
S-95	9750	W-95	15700	29.26	54	16	105	5	19	65
S-96	10150	W-96	16240	29.26	54	17	111	5	19	65
S-97	10500	W-97	16800	29 26	54	18	117	5	19	65
S-106	11000	W-106	17600	32.52	60	18	120	5	20	70
S-107	11250	W-107	18000	32.52	60	19	127	5	20	70
S-108	12100	W-108	19360	32.52	60	20	134	5	20	70
S-117	12250	W-117	19600	36.0	66	20	140	6	21	75
S-118	12650	W-118	20240	36.0	66	21	147	6	21	75
S-119	13000	W-119	20800	36.0	66	22	153	6	21	75
S-1110	15000	W-1110	24000	36.0	66	23	160	6	21	75

24" SERIES—DOUBLE-GRATE, DOWN-DRAFT, "SMOKELESS"

Water-line 57 in. Height overall 67 in. Outlets 4 in. Width 36 in. Returns 2 in.

S-432	1650	W-432	2640	5 0	15	7	85	.....	12	30
S-433	1800	W-433	2880	5.0	15	8	40	.....	12	30
S-443	2200	W-443	3620	6 60	20	9	45	.....	15	35
S-444	2400	W-444	3840	6.66	20	10	50	.....	15	35
S-454	2700	W-454	4320	8.32	25	11	60	.....	16	35
S-455	3000	W-455	4800	8.32	25	12	65	.....	16	35
S-465	3250	W-465	5200	10 0	30	13	70	.....	16	35
S-466	3450	W-466	5520	10.0	30	14	75	.....	18	35
S-476	3800	W-476	6080	11.16	35	15	80	.....	18	40
S-477	4000	W-477	6400	11.18	35	16	85	.....	18	40

Universal Smokeless Boiler Co.

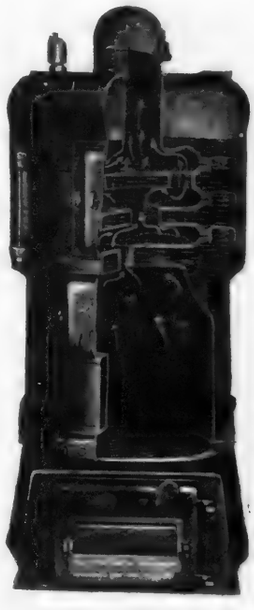
Ravenna, Ohio

THATCHER ROUND BOILER

Explain to your Customer the Meaning of "Staggered Fire Travel"

THE white arrows, shown in the accompanying illustration, will enable you to explain to him just how the flames and hot gases are forced to travel back and forth: under, over and around thin layers of water, before they are permitted to escape up the chimney.

Any one will see that this means quicker heat, greater heat, and big economy in coal consumption.



You will have a satisfied and pleased customer, when you sell him a Thatcher Round Boiler, for either steam or hot water heating.

Its triangular, revolving grates—for breaking up and removing clinkers; its deep fire-pot — making frequent firing unnecessary; its smooth working sylphon automatic damper regulator (on steam boilers), and other special features, make it simple and easy to operate as well as efficient and economical.

Write for information regarding our full line of heating and cooking plants.

THE THATCHER COMPANY

formerly Thatcher Furnace Co.

Since 1850

341 N. Clark St. Chicago — 39-41 St. Francis St. NEWARK, N. J. — 21 W. 44th St. New York

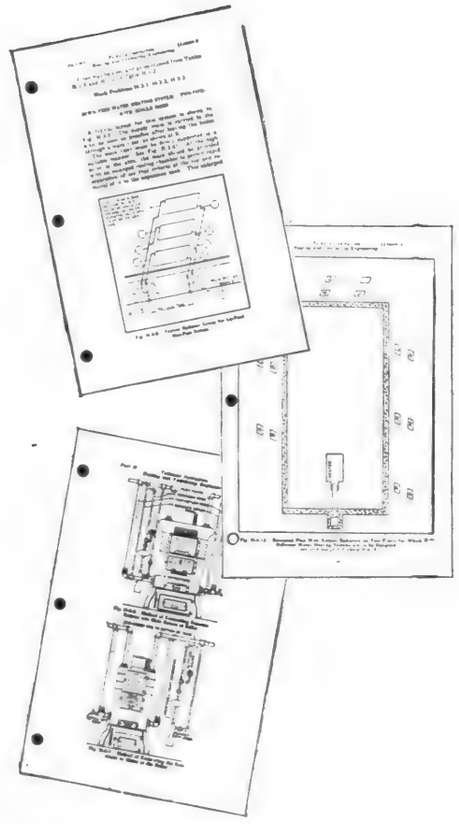
THATCHER

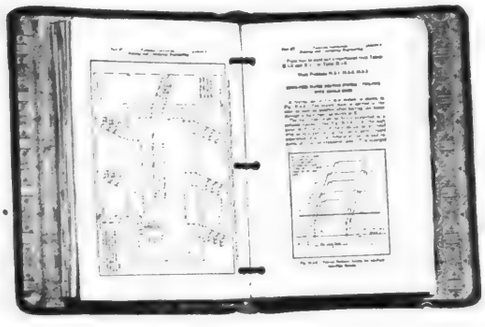
BOILERS-FURNACES-RANGES

At last What you have been waiting for—*in loose leaf form*

NEW HOME STUDY COURSE

in GRAVITY, STEAM *and* WATER HEATING





The New Home Study Course in Gravity Steam and Water Heating which has been one of the most popular features in THE HEATING AND VENTILATING MAGAZINE during the past two years is now ready in loose-leaf form (without instruction and work problem features) for the astonishing low price of

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Never before offered in reprinted form except to purchasers of the correspondence course which sells for $120.00.

First eighteen lessons are now reprinted and ready. The balance of the course, approximately twelve lessons, will be sent to you without additional cost as soon as reprinted after publication in THE HEATING AND VENTILATING MAGAZINE. Each lesson is paper bound and punched for ring binder.

Ring-binder with heavy cloth binding specially designed to hold course will be furnished for $1.35. One binder will hold the first eighteen lessons now ready. Two binders are necessary to hold the entire course.

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Gentlemen:

Yes, I want the Home Study Course in reprinted form (without instruction work problem features). Enclosed is $10.00 in payment for the complete course. I also enclose

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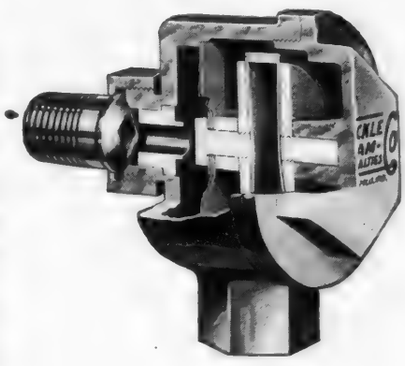
STICKLE RADIATOR TRAPS

Installations ten and twelve years old. Still in satisfactory service in large establishments are to the credit of the trap to the left.

Are you getting tired of changing traps on the same job every few years? We solicit your inquiries on the Stickle (patented) Bucket Type Radiator Trap. All sizes from ½" to 2" inlets and outlets.



Look at the Stickle Thermostatic Radiator Trap. Don't you think it has some good points, with the loose diaphragm, flat leaf spring, and position of valve and seat? See how the diaphragm is protected. It is patented. Yet you will be surprised at the low price, but not unless you will let us get in touch with you. Drop us a line now.

STICKLE STEAM SPECIALTIES CO.

NEW YORK **Indianapolis, Ind.** BOSTON

Wainwright Heaters in the plant of the Morse Twist Drill Co., New Bedford, Mass.

IF you design hot water systems you will want our Bulletin H-54

THIS bulletin gives the capacities of Wainwright Heaters when heating water over different temperature ranges. The dimensions of standard Wainwright heaters with installation drawings are also included. Wainwright Heaters are of the instantaneous type, heating water when, and as, needed. They may be supplied with straight or corrugated tubes as required by operating conditions.

Floating tube heads eliminate expansion and contraction strains due to the rapid changes in temperature encountered in service. These heaters, in addition to being used for hot water service heaters, are also adapted to use as hot water heating system heaters, boiler feed water heaters, etc.

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Works—CARTERET, N. J. and NEWBURGH, N. Y.

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One Float Operates the
No. 2 THERMOFLEX DUPLEX BOILER FEEDER

A BOILER FEEDER THAT IS *NOT* AFFECTED BY THE *NORMAL* FLUCTUATION OF THE BOILER WATER LINE. THE OVERFLOW FUNCTIONS ONLY UNDER UNUSUAL CONDITIONS.

Let us tell you about it.

W. D. CASHIN COMPANY

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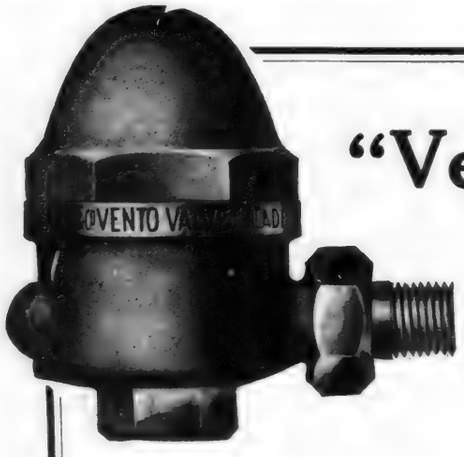

"Vento" Gives Assurance

The Vento Automatic Valve gives an assurance of perfect control—Not a particle of steam gets away—Nothing gets out that should stay in; nothing stays in that should get out.

Further, and of importance—the Vento valve mechanism is so simplified as to render it an easy, quick task to remove all internal parts;—the ordinary layman may with ease take apart and reassemble. This makes Vento very valuable.

Superior Assets—

of the "Vento System"

System starts with valve wide open, assuring circulation almost the instant steam is turned on.

Control of valve opening from two to eight times larger than other makes of valves.

Size of valve opening reduces danger of fouling with scale or other foreign matter.

Closes absolutely tight against steam. No necessity for use of spray water at pump.

Cannot stick or gum from foreign matter, and operation is absolutely noiseless.

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WILLIAM S. HAINES & CO.

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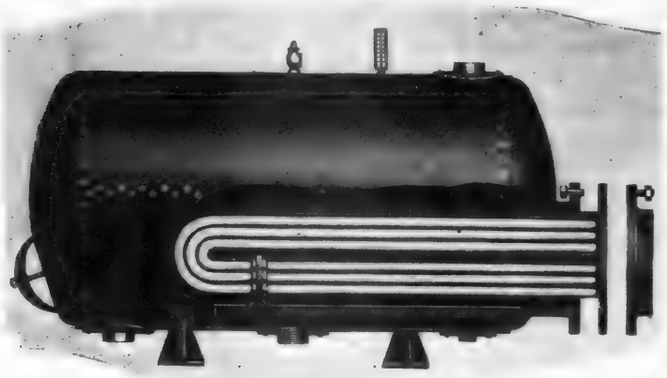
VENTO

NATIONAL
Storage U BEND TYPE Heater



Solid Copper Construction

Solid copper shell

fabricated in accordance with Standard Boiler Practice, and made of pure electrolytic copper.

Heavy copper tubes

seamless drawn of heavier gauge than ordinarily used.

Cast bronze tube plate

also bronze tappings and supports. All parts coming in contact with the water are of non-ferrous metal.

We are justified in describing the Solid Copper National in the superlative degree. It is by far the best made, most efficient heater you can buy and it will never wear out. We build it for the better class of apartments, clubs, etc., and although it lists higher than a steel shell heater, you will be surprised at the price comparison.

Let us quote you on your specifications.

The National Pipe Bending Co.
Established 1883 **120 River Street**
New Haven, Conn.
BOSTON NEW YORK PHILADELPHIA

The O-E Improved Wheel Handle Valve

Without a Single Compromise in All Body Types

EMBODIES all the desirable features that 35 years' experience in valve design and construction was possible to incorporate.

The "Jack Screw" principle, applied to the action members assures perfect operation indefinitely—will never stick.

When those who select the mechanical equipment for any building look about for a valve that embodies pleasing design—lasting performance—combined with a ruggedness, that will stand, installation punishment—they just naturally gravitate towards the improved "O-E" Packless Valve.

O-E SPECIALTY MFG. COMPANY
12 Keefe Avenue, Milwaukee, Wis.

Sales and Service Offices and stock carried in all principal cities.

We Don't Compete With Consulting Engineers

IT is our unvarying policy to *co-operate* with Consulting Engineers, instead of *competing* with them. We are always glad to give *Engineers* details of application or any service they should require.

You can depend on us for full co-operation when you specify "Sarco" Radiator Traps, Steam Traps, Temperature Regulators, Packless Inlet Valves and Strainers. And you can feel absolutely protected against any possible trouble or kicks after installation. We back you to the limit.

Most engineers and architects know this. That is why Sarco products have won the unqualified confidence of shrewd, far-seeing engineers and architects in all parts of the country.

Let us tell you more about the Sarco line and our policy of co-operation. Won't you write us for Booklet P, of all Sarco products?

SARCO CO., Inc.

183 Madison Ave., New York City

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BUFFALO CLEVELAND PHILADELPHIA
PEACOCK BROS., LTD., MONTREAL

"Keeping Others In Hot Water"—

for
Hotels, apartment buildings, hospitals, Y. M. C. A. buildings, schools and laundries

Special Attention Given to Installations Requiring Large Quantities of Hot Water, with Live or Exhaust Steam as the Heating Medium.

—may be a pastime for some folks, but for the Sims Company it is a serious proposition—a matter requiring a thorough knowledge of hot water requirements.

A long study of these requirements enables us to offer heaters that assure constant and efficient hot water service.

Engineers feel safe in specifying "SIMS" because they know it means **reliability**—a service you want to render your client.

SIMS CLEAN E-Z STEAM TUBE STORAGE HEATER

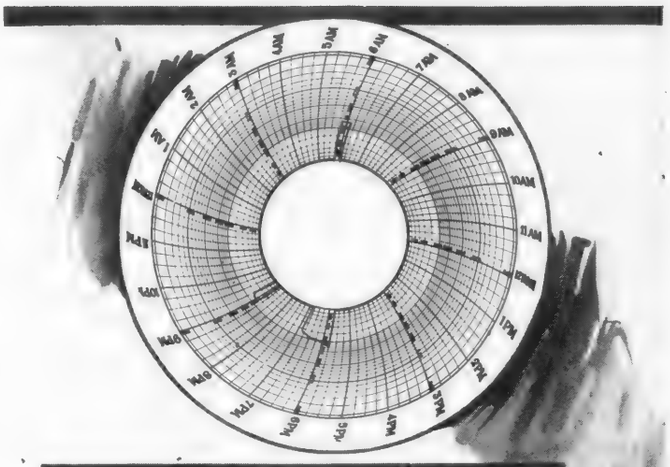
Our Engineers will gladly confer with you, without obligation, on your hot water problems.

THE SIMS CO.

Erie, Pa.

A good place to live, to work and to play.

How to serve more customers with the same amount of Steam



THE chart above covers 24 hours ending 8:30 A. M. Wednesday, April 13, 1926, in the Congregational Church, Springfield, Ohio. Average outside temperature 60°; inside temperature, thermostat set for 55°.

The "Master" Control Valve opened and admitted steam only 3 times—for a total of 1 hour 50 minutes.

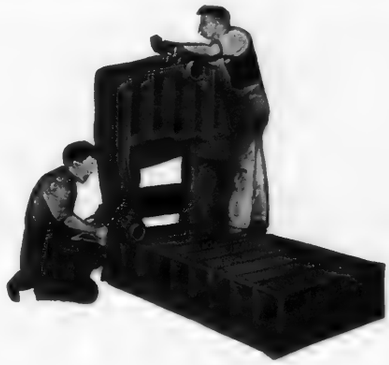
If no customer can use more steam than is really needed, you will save in the boiler room, in mild weather, and in cold weather will have enough steam to serve more customers than you can now take on. And complaints about big bills, from your customers, will stop!

Think that over—and ask us for more particulars.

CENTRAL HEAT APPLIANCES

J. C. Hornung, Engineer

343 S. Dearborn Street, Chicago, Ill. (3432)



Have You Considered the Economy of Short Tie Bolts?

Sometimes we overlook a little thing and suddenly discover it to be a big one—in results. Take the Burnham short tie bolt, for instance.

Here are two fairly intelligent men, setting up a Burnham Square Sectional Boiler, with the assurance of getting everything right, and only an ordinary amount of physical effort.

Each section fits exactly in place, and is firmly bolted to stay.

No waiting until all sections are in place—no bothersome long bolts to adjust nor chance of sections slipping out of position in the process.

Taken together with the well known Burnham record as heat producers, this short bolt feature is a clincher with harassed heating engineers.

It saves you time and labor on the job, while delivering a better type of boiler and a more dependable grade of heating service.

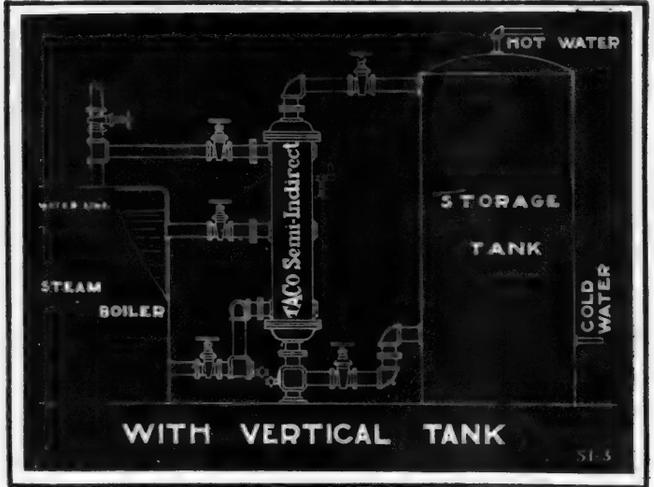
Write for the Burnham Book of Boiler Facts.

Burnham Boiler Corporation

IRVINGTON, N. Y.

New York Office: 30 East 42nd Street
Representatives and Branch Offices in Principal Cities of U. S. and Canada

TACO SEMI-INDIRECT

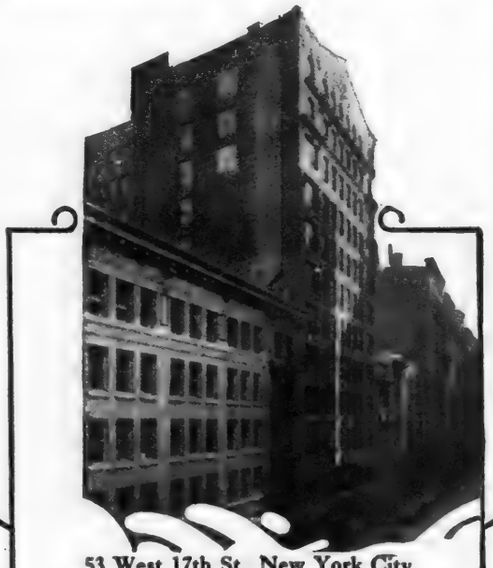


For use with Oil Burning Equipment

The design of the TACO SEMI-INDIRECT makes it especially adaptable for successful use with vertical storage tanks. As this heater is vertical, circulation to the tank starts very close to the floor and a positive circulation is established between the heater and the tank.

Tanks will be heated down to a level with the bottom of the heater.

THERMAL APPLIANCE COMPANY
342 Madison Ave. New York City



53 West 17th St., New York City
Owner: UNITED CIGAR STORES CO.

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RADIATOR BRACKETS

The radiator hangers used in the construction of a building furnish a good guide in determining the quality of the job. Hartmann Brackets are always to be found in a high-class installation because Architects, Engineers and Contractors have experienced that Hartmann Radiator Brackets are accurately and strongly made, are economical and always dependable.

THREE STYLES

A R N R N V

Write for descriptive circular and price list

Charles Hartmann Co.

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Quality KIELEY Simplicity
REGISTERED TRADE MARK

A Return Trap once Installed

Takes a position of importance. For that reason the Kieley Champion Return Trap with all working parts accessible and the simplicity of its valve mechanism has always found favor.

Send for a Catalogue Illustrating these and other Specialties

KIELEY & MUELLER, Inc.

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Absolute Dependability
Since 1866

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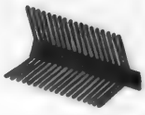
A COMPLETE LINE OF
BRONZE and IRON-BODY VALVES
BUILT FOR LONG LIFE



Scott Bronze Regrinding Union Bonnet Globes and Angles are quality valves in every respect. Combining unusually pleasing appearance with the high standard of material and workmanship that is characteristic of all Scott Valves, they are specially suited for the higher pressures and more severe services for which this type of valve is generally selected. Splendid valves, whose performance equals their appearance.

—literature gladly sent on request

No. 200
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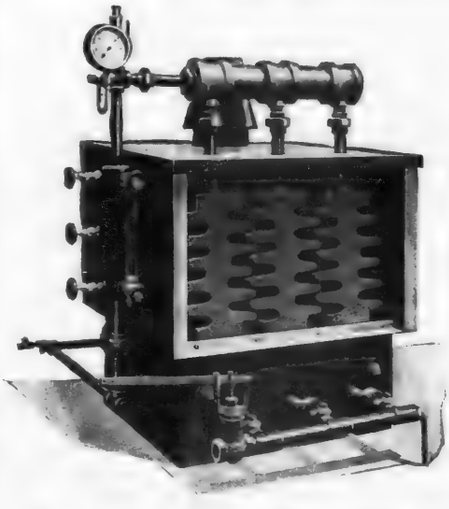
200 lbs.

SIGN OF VALUE

SCOTT VALVE MFG. CO.
DETROIT MICH.
"MAXIMUM SERVICE PER DOLLAR"

SIGN OF VALUE



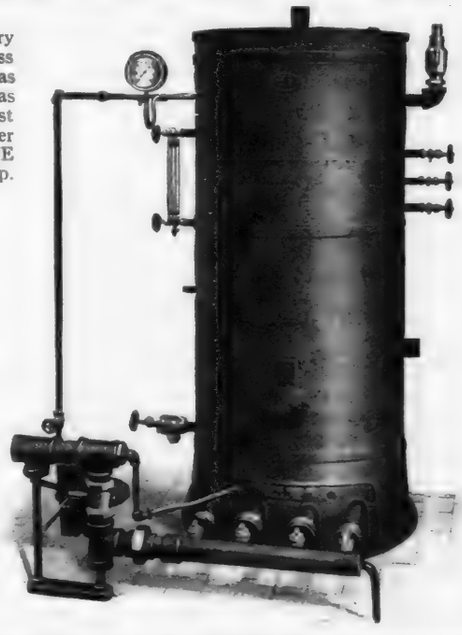
Leadership

Is never the result of an Accident

IN 1896, when Wm. Kane presented to this country the first gas-fired steam boiler, it was only after exhaustive work on his part to convince the public that gas boilers were here to stay.

Since its inception, Kane Gas Boilers were eagerly sought by engineers for particular jobs where economy and dependability were factors, and fulfilled every expectation.

Today there is not an industry requiring steam for their process work that is without a KANE Gas Boiler. No other Gas Boiler has been able to outperform or outlast the KANE. No other gas boiler has been able to replace the KANE or dethrone it from the leadership.



Kane Gas Boilers again triumph

Now KANE Gas Fired House-Heating Boilers are available to the Heating trade. Knowing how to build gas boilers correctly has enabled KANE Engineers to design a gas boiler that can be depended upon to perform and fulfill every customer's expectations. Let us point out to you the advantages of the KANE Gas Boiler, how it can be more easily assembled, why it costs the customer less to install and operate. Just ask for Bulletin 633.

MONARCH SALES & ENGINEERING CO.

363 W. Erie St., Chicago, Ill.
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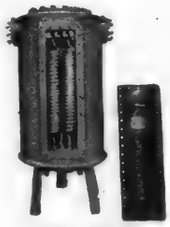
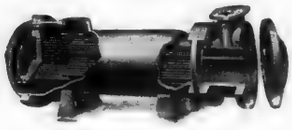
KANE GAS BOILERS

Hot Water for every service

Instantaneous Heaters



Reilly Heater



G-R Instantaneous Heater

The Reilly and G-R Instantaneous Heaters have the highest rate of heat transfer of any closed heater on the market. Used in thousands of installations where large quantities of hot water are continuously required.

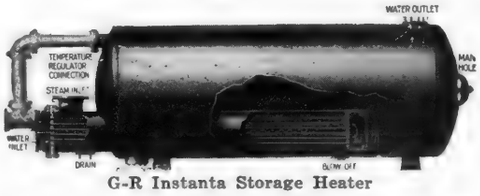
Storage Heaters

G-R U-Tube Storage Heater

G-R Straight Tube Storage Heater

The G-R U-tube and Straight Tube Storage Heaters are the ideal types where only a limited amount of exhaust steam is available. Furnished for any conditions of steam supply and storage requirements.

Combination Storage and Instantaneous Heater



G-R Instanta Storage Heater

The G-R Instanta Storage Heater combines all the advantages of both instantaneous and storage heater types without the limitations of either. Its many special features have made it widely popular.

The Griscom-Russell Company
Dept. H. 285 Madison Ave., New York
BRANCHES IN 24 CITIES

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THE GRISCOM-RUSSELL CO.,
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Gentlemen:—

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STEEL HEATING BOILERS

Exclusive Territory Open to High Grade Sales Representatives.

Steam — Vapor

Coal, Oil or Gas

The large combustion chamber with an enormous heating surface to grate makes this a most efficient and economical boiler. Low water line and insulated steel casings make installations easy and quick.

This boiler is an ideal oil burning proposition. Write for literature and prices.

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EZ

RADIATOR HANGER

HERE'S the hanger made with both up and down and sideway adjustments. No accurate placing of anchor bolt necessary.

For ANY wall—any type of radiator.

HEALY-RUFF CO.
772 Hampden Avenue,
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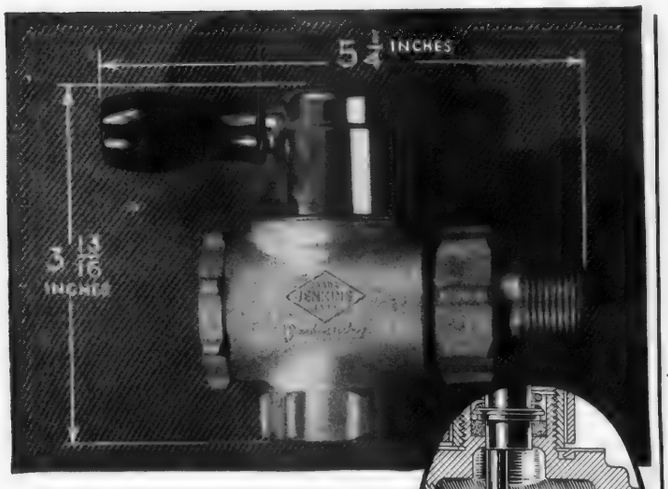
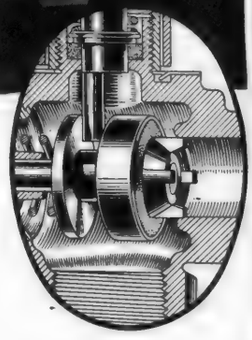
"A big help to Customers"

Style R





New Modulating Valve

With Vertical Seat Instead of Horizontal

Jenkins Fig. 700 is a notable improvement in a supply control valve for low-pressure steam, vapor, or vacuum heating systems.

It is a patented valve with a Jenkins Rubber Composition Disc and seat in a vertical plane, a departure from the ordinary horizontal seat design. Scale or core sand is prevented from lodging on the seat and hindering tight closing of the valve.

Steam enters at top of seat and condensation drains out at the bottom of seat—a particular advantage on a one-pipe steam system, because flow of steam is not retarded by returning condensation, thereby eliminating gurgling, water-hammer, and shock.

Vacuum is under the disc holder, not on top of it, preventing any loss of vacuum when the valve is closed.

Seating and tightness do not depend on a threaded spindle. A spring holds disc against the seat and valve always seats perfectly when the indicator points to "OFF".

Write for Bulletin 105, which gives complete details.

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80 White Street.....New York, N. Y.
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JENKINS BROS. LIMITED

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Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

Free from Sticking!

No. 202 Hot Water Radiator Valve

So designed that the half-turn of the handle, which opens and closes the valve, pushes the shell up and down and makes sticking impossible.

Working parts made entirely of brass rod and casting.

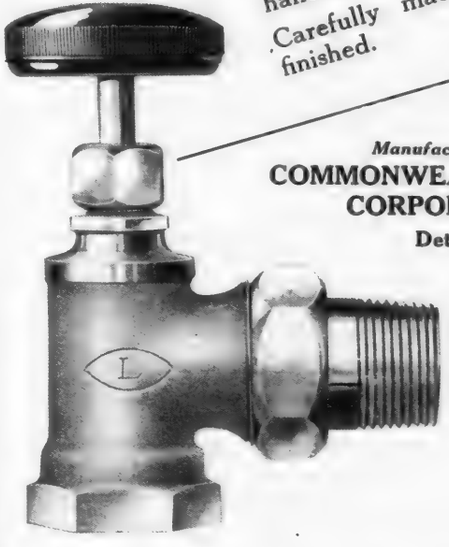
Shell and stem cast in one piece.

Packed with an asbestos ring, having a metal insert.

Ample thread space on intake end. Tail nut of forged brass, instead of usual casting.

Patented "Knobby Grip" handle, with milled edge.

Carefully machined and finished.



Manufactured by
COMMONWEALTH BRASS CORPORATION
Detroit

Your Jobber Can Supply You

COMMONWEALTH
LAVIGNE
RADIATOR VALVES

July – $1,485,200

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that's the astounding rate at which the public is buying the

New *Silent* Nokol

THE New Silent NOKOL—a sensational development in oil heat history -is now an outstanding success among all oil burners.

Here are the figures. Here are the facts. Month after month NOKOL installations are making new and unprecedented records.

There must be sound reason for this growth. There is! The past high efficiency and economy of NOKOL known to 35,000 home owners is actually increased. Noise is cut to the vanishing point. Now, everyone can really enjoy the luxury of *silence.*

NOKOL owners know that NOKOL provides low cost heat without using low grade fuel oil. They know that it costs no more than hard coal—*usually less.*

\- - - -

And the NOKOL budget plan makes every home owner a prospect—those of moderate means as well as the wealthy ones. In fact, 58% of our sales are to owners of smaller homes men and women who know the true meaning of economy.

If the NOKOL franchise is open in your community, here's an opportunity you can't afford to overlook. Write today for booklets and full details of our dealer proposition.

NEW *Silent*

NO COAL

NOKOL

REG. U.S. PAT. OFF.

AUTOMATIC OIL HEATING FOR HOMES

FREE — NEW BOOK

AMERICAN NOKOL COMPANY
Dept. 24, 215 North Michigan Ave., Chicago, Ill.

Please send your new book on OIL HEAT. Also dealer proposition.

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Address.....

City..... *State*.....

DEALERS

INVESTIGATE carefully from every angle the oil burner you are to sell and service. Be sure you can unhesitatingly recommend it to your neighbors. Give thought to the reputation and financial responsibility of the manufacturer. Select a burner that has been tried and proved.

The Super Silent Sword Automatic Oil Burner is designed especially for heating the average American Home. It is simple to install and requires little or no service after the proper adjustments are made at the time of installing.

The Sword principle of combustion marked the true opening of a great new era of home heating. It is a patented feature of the Sword Burner, thus establishing it as a leading domestic oil burner of the American market. The Sword principle of combustion is responsible for Silent operation, high efficiency and uniform dependability

Send for Details

Territory is being assigned rapidly to reliable firms and individuals of good standing. Write or wire for dealer's proposition.

The Super Silent

SWORD

Automatic Oil Burner

Listed as standard by the Underwriters' Laboratories

SWORD & KIMBER COMPANY

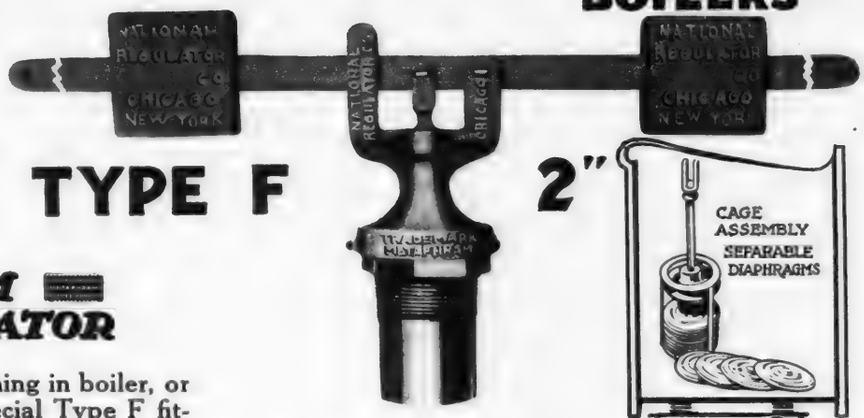
Manufacturers

4861 STENTON AVE., PHILADELPHIA

"You've never heard a silent burner unless you've seen the Sword"

Damper Regulator *for* HOT WATER BOILERS

Standard equipment on the better boilers. No hot water job is complete without a damper regulator. Make installations more efficient—more satisfactory and more profitable by adding a Type F. 2″



METAPHRAM DAMPER REGULATOR

Type F regulator is installed in 2″ opening in boiler, or in pipe line, using Y fitting or the special Type F fitting made for the purpose—which saves work.

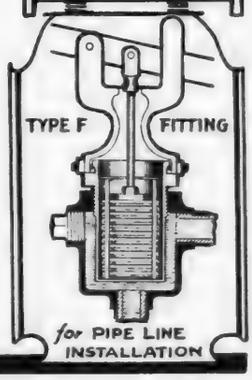
There is a big field for you, selling and installing this sensitive but positive regulator— on new or old installations.

Order from your jobber or direct.

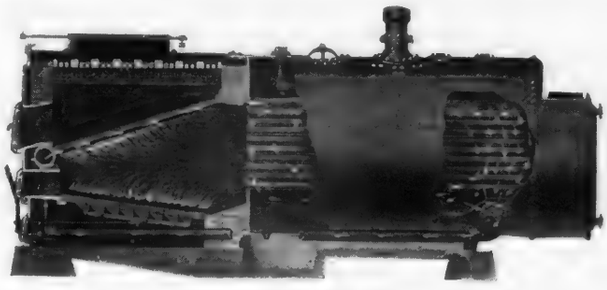
Write for Circular

NATIONAL REGULATOR CO.
2301 KNOX AVENUE CHICAGO

Each Metaphram or "wafer" is a hermetically sealed chamber containing a volatile liquid which expands with increase of temperature. Several of these together furnish the power that operates the lever. The separable Metaphrams are "cage assembly" and are lifted from the well as a unit, should replacement ever be necessary.



METAPHRAM



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Improved!

STANWOOD *Smokeless* BOILERS

WORKING PRESSURES *15 to 250 lbs - SIZES 29 to 210 hp*

This remarkable compact little boiler—needing no outside bricking—without mudlegs or staybolts—possessing an extremely low water line—with a unique system of rapidly circulating water and affording features at points where most boilers develop weaknesses has already demonstrated its great efficiency in thousands of installations throughout the country. And now many refinements in its 17 amazing features contribute a completeness and perfection of which this old established house is justly proud.

Write for detailed pamphlets on this epoch making boiler. 17 features combine to make it a money saver in installation, operation and maintenance.

The Stanwood Corporation

Cincinnati, O. Est. 1891

Manufacturers also of Horizontal Return Tubular Boilers, Stacks, Tanks, Breechings and Throttling and Automatic Steam Engines.

THE STANWOOD CORPORATION, Dept. D-10
Cincinnati, Ohio.

Please send me pamphlets describing in detail the Stanwood Boiler.

Name.....

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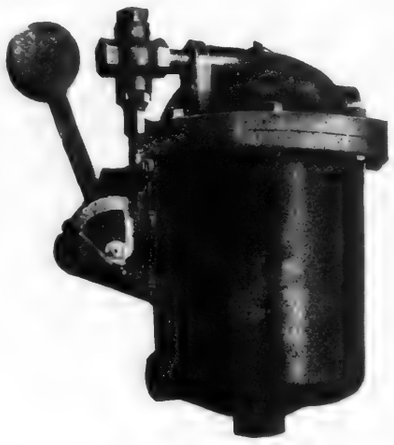
THERMO SYPHON TRAP

For All Types of

Steam Heating Systems



Returns Condensation Under All Pressures

AN important factor in the proper functioning of a heating system is the return of condensation to the boiler.

The THERMO SYPHON TRAP collects all condensation as it forms and returns it to the boiler regardless of pressure or vacuum. Assures proper circulation and noiseless operation.

Especially designed to handle condensation from any type of one-pipe or two-pipe steam heating system. Approved by heating experts and used with success on the various prominent patented Vapor, Vacuum, Atmospheric and Modulation Systems. Also a safeguard against burning or cracking of boilers due to water leaving boiler or becoming locked in system.

It is well worth investigating. Send for Bulletin No. 16-HV, giving full details.

LYTTON MANUFACTURING CORPORATION

HIGH GRADE

Return, Vacuum, Lifting and Separating

Steam Traps

Reducing Valves Blow-off Valves

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THE DESIGN OF GRAVITY-CIRCULATION WATER HEATING SYSTEMS. By F. E. Giesecke, Ph. D. A book, remarkable for its conciseness and clearness of expression, which contains the essence of the information needed for the proper design of gravity water heating systems, based on the principle that the frictional resistance must equal the force maintaining flow. The importance of the presentation is evidenced by the fact that the entire water heating section of the A. S. H. & V. E. Compendium of Modern Practice has been discarded and replaced with a new section by Dr. Giesecke, embodying the methods here presented in detail. 64 pages of text and 10 pages of tables and charts. Price, $3.00.

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PRACTICAL STEAM, HOT WATER HEATING AND VENTILATION. By Alfred G. King. Containing 396 illustrations. The book is a working manual for heating contractors, journeymen, steam fitters, architects and builders. Describes various systems of heating and ventilation and includes useful data and tables for estimating, installing and testing such systems. 8vo. 367 pages. Price, $4.00.

MECHANICS OF HEATING AND VENTILATING. By Konrad Meier. Including a series of ten charts containing data relating to the flow of water, steam and air, collected by Mr. Meier during an experience of 26 years in heating and ventilating work, both in this country and abroad. Each of the charts replaces a series of tables on the subject, giving at a glance the results of a calculation from any combination of factors. 161 pages, illustrated, with ten large charts. Size 6 x 9 in. Price, $5.00. Separate sets of charts printed on cloth, with lines in different colors and mounted on boards. Single charts, $1.50. Sets of ten, $15.00.

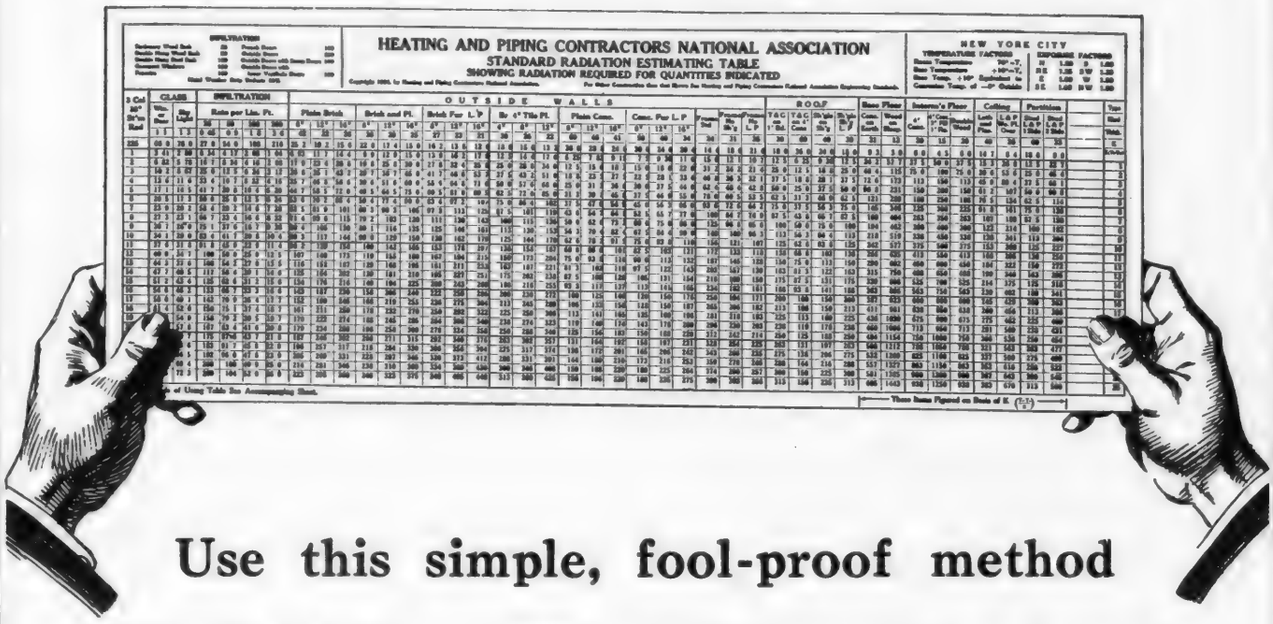
HOUSE HEATING WITH OIL FUEL. Presents in concise form the meat of the available information on the various phases of the problem of oil burners as a source of heat for homes. By P. E. Fansler, E.E., Associate Editor, The Heating and Ventilating Magazine. Second edition, 63 pages, with charts and illustrations. Price $1.00.

HANDBOOK FOR HEATING AND VENTILATING ENGINEERS. By James D. Hoffman. Fourth edition of this important work entirely rewritten and reset. A standard manual covering theory and practice, with special chapters on heat losses, furnace heating, water and steam heating, mechanical vacuum heating, mechanical warm-air heating, temperature control, electrical heating and refrigeration. With appendix of 75 tables. Size 4½ x 6¾ in. Pp. 478. Price $4.50 postpaid.

HANDBOOK OF THE NATIONAL DISTRICT HEATING ASSOCIATION. Devoted to data on all phases of Central Station heating work, including generation, distribution, utilization, meters and water heating, compiled by the Association's Educational Committee. All new and revised data for this book will be supplied free for five years. Bound in leather, with six-ring binder. Price $5.00, postpaid.

THE HEATING and VENTILATING MAGAZINE
1123 BROADWAY, NEW YORK

The successful heating contractor knows most about RADIATION



Use this simple, fool-proof method

Radiation tables for the following cities have been prepared by the Heating and Piping Contractors National Association:

Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Detroit, Mich.
Denver, Colo.
Eastport, Me.
Kansas City, Mo.
Los Angeles, Cal.
Madison, Wis.
Memphis, Tenn.
Milwaukee, Wis.
New York, N. Y.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
San Francisco, Cal
Salt Lake City, Utah.
San Antonio, Texas
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Note: If your city is not listed, request chart for city nearest to your locality.

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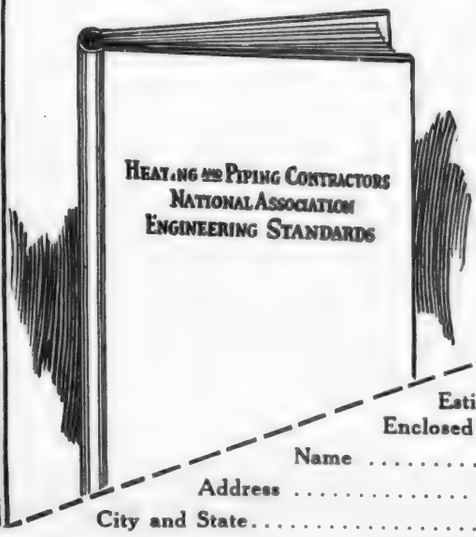

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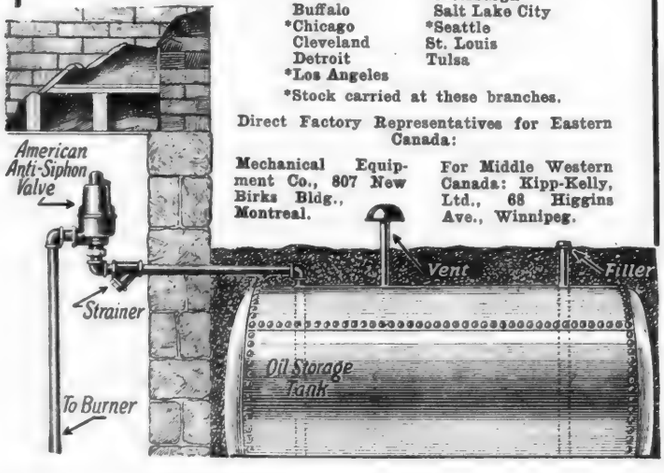

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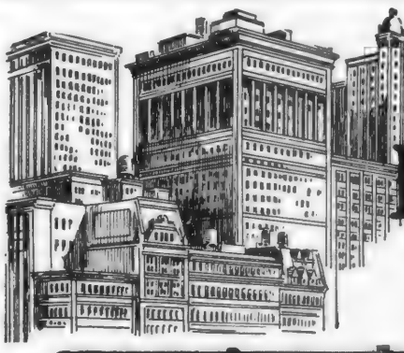

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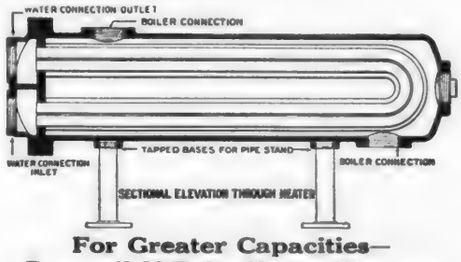

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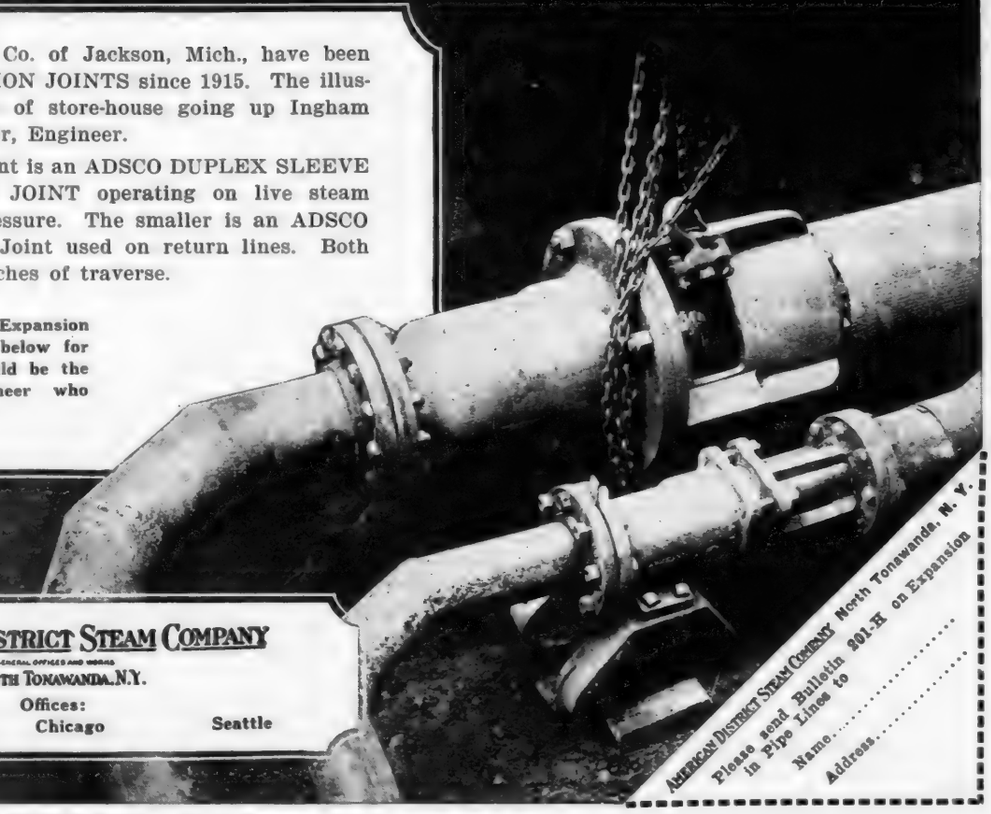
For full reference data on Expansion in Pipe Lines use coupon below for Bulletin 201-H. This should be the reference of every engineer who specifies Expansion Joints.



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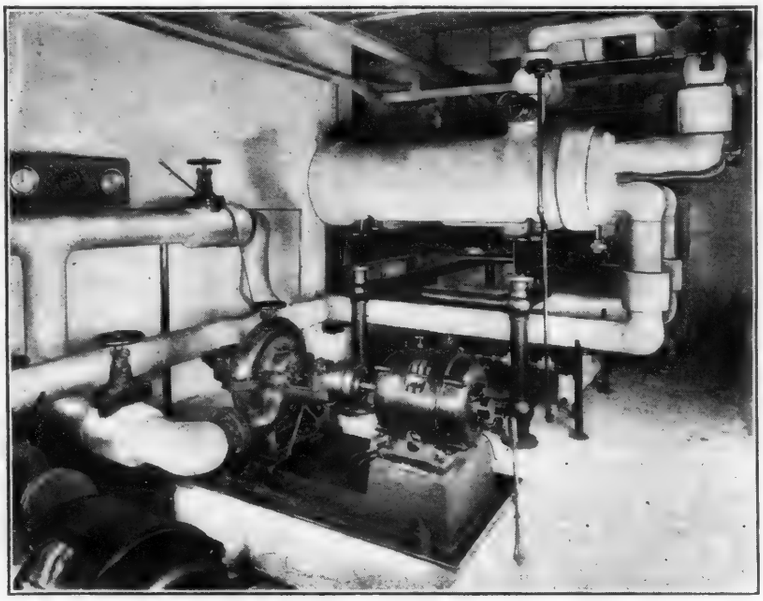

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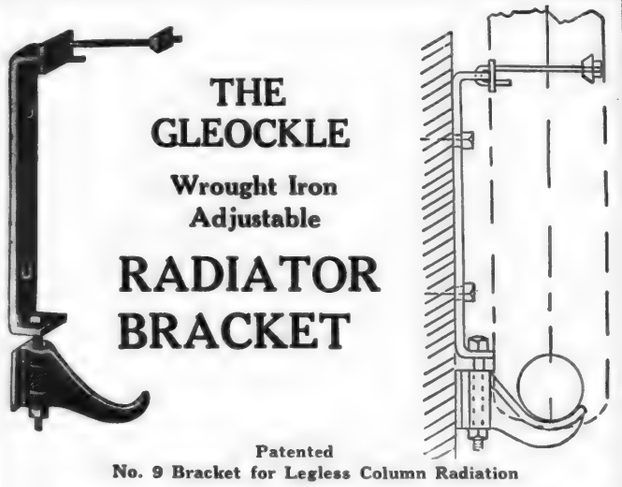

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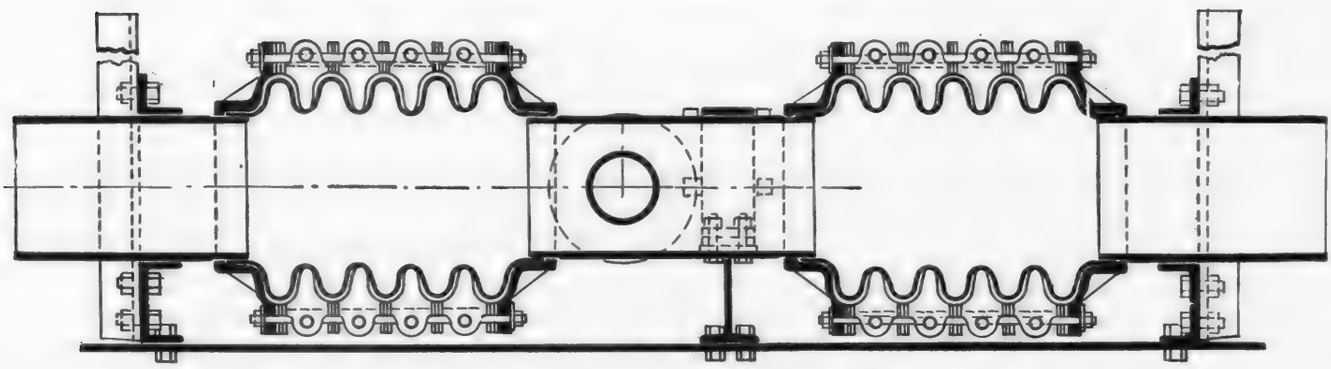

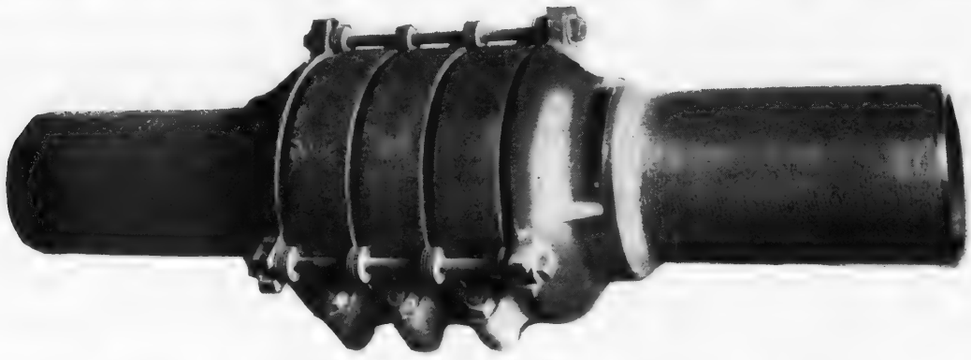

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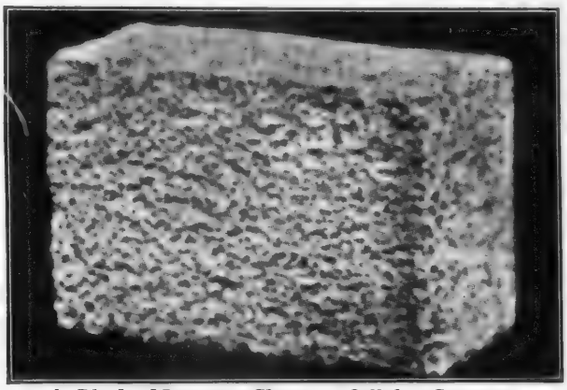
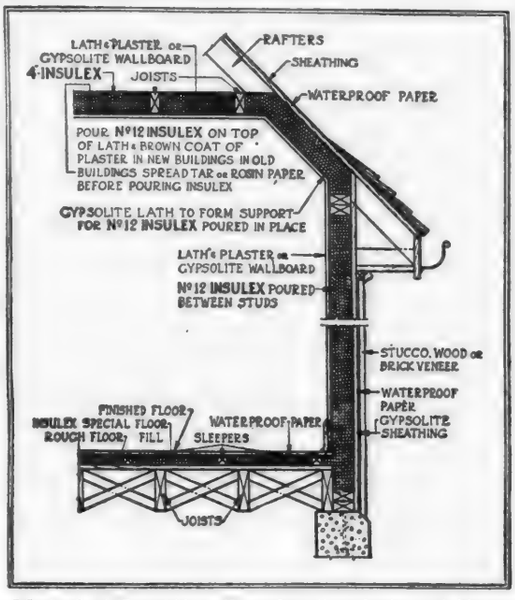


A Block of INSULEX *Showing Cellular Structure*

The use of **Insulex** reduces the size of heating plants and amount of radiation installed so that in estimating the heating requirements of a building using **Insulex** insulation special conductivity factors are required.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WATERPROOF PAPER
SLEEPERS
JOISTS

Method of Providing Complete Insulation of House

Complete A. I. A. Specifications, reports of tests and engineering data on **Insulex** will be furnished on application. Our staff of heating engineers will help solve your problems on reduced radiation.

BUILDING CONSTRUCTION*

SIDE WALL (FRAME)	UNINSULATED		INSULATED By Filling Stud Space With No. 12 INSULEX	
			Lath and Plaster	Gypsolite Plaster Board and Plaster
Clapboard, Stud, Lath and Plaster	....	.345	.082	.079
Clapboard, Paper, Sheathing, Stud, Lath and Plaster	....	.263	.076	.073
Brick Veneer, Paper, Sheathing, Lath and Plaster	....	.251	.075	.073
Cement Stucco, Paper, Sheathing, Lath and Plaster	....	.255	.075	.073
SIDE WALL (MASONRY)			By Using 2-Inch Furring Strips and Filling Space with No. 12 INSULEX	
Brick Wall—Plastered Inside:	No Furring Strips	With Furring Strips	Lath and Plaster	Gypsolite Plaster Board and Plaster
8-inch	.379	.272	.111	.105
12- "	.296	.228	.103	.098
16- "	.243	.196	.096	.091
Terra-Cotta Wall—Stucco Exterior—Plastered Inside:				
8-inch	.291	.224	.102	.096
12- "	.225	.183	.093	.088
16- "	.184	.155	.095	.081
CEILING			Filling Space Between Joists 4-Inches With No. 12 INSULEX	
			Lath and Plaster	Gypsolite Plaster Board and Plaster
Ceiling Joists, Lath and Plaster	....	.692	.082	.079

***New Heating Constants**—For use in determining house heating radiation requirements when insulated with **Insulex**, according to UNIVERSAL GYPSUM COMPANY'S specifications.

The Armour Institute of Technology, Chicago, Illinois, have prepared the following figures based on tests and years of experience showing the amount of heat lost through various kinds of construction. Prepared by Professor J. C. Peebles.

The figures given are in B.t.u.'s per square foot per hour per degree temperature difference and show heat loss or conductivity. These figures can be used in figuring reduced size of heating plants and radiation required in an **Insulexed** home.

UNIVERSAL GYPSUM & LIME CO., *Chicago*

District Offices
New York, N. Y. Fort Dodge, Iowa
Atlanta, Ga. Kansas City, Mo.

111 West Washington Street

Mills
Akron, N. Y. Fort Dodge, Iowa
Batavia, N. Y. Rotan, Texas

ENGINEERS' SPECIFICATION INDEX (Continued)

ENGINES.

Steam, Automatic.

American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Steam, High Speed.

American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Sturtevant Co., B. F., Hyde Park, Mass.

EQUALIZING LOOPS.

Hoffman Specialty Co., New York.

EVAPORATORS.

Boiler Feed Make-Up.

Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

EXHAUST HEADS.

Aeolus Dickinson Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wright-Austin Co., Detroit, Mich.

EXHAUST SYSTEMS.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N Y.
Ilg Electric Ventilating Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

EXPANSION JOINTS.

American District Steam Co., No. Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Dahlquist Mfg. Co., Boston, Mass.
Griscom-Russell Co., New York.
Hornung, J. C., Chicago, Ill.
Howard Iron Works, Buffalo, N. Y.
Illinois Engineering Co., Chicago, Ill.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Webster & Co., Warren, Camden, N. J.
Wheeler Condenser & Engineering Co., Carteret, N. J.

EXPANSION SHELLS

Phillips Drill Co., Chicago, Ill.

EXPOSITIONS

Power Show

International Exposition Co., New York.

FANS, EXHAUST.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

FEEDERS

Boiler

Cashin Co., W. D., Boston, Mass.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

FILTERS, (Aerating).

Davis Engineering Corp., New York.
Griscom-Russell Co., New York.

Feed-Water.

Davis Engineering Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.

FITTINGS, FLANGED.

American District Steam Co., No. Tonawanda, N. Y.
Clow and Sons, Jas. B., Chicago, Ill.
Grinnell Company, Providence, R. I.

FLANGES.

American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.

FOUNDATIONS

Machine

Cork Foundation Co., New York.

GAS BURNERS

Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.

GASKETS, METALLIC.

Sarco Co., New York.

GAUGE BOARDS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Webster & Co., Warren, Camden, N. J.

GAUGES.

Altitude

Federal Gauge Company, Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.

Draft.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Hydraulic.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Federal Gauge Company, Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Ounce Graduated.

Federal Gauge Company, Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.

Pressure.

American Dist. Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Federal Gauge Company, Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Federal Gauge Company, Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum (Compound).

Cashin Co., W. D., Boston, Mass.
Federal Gauge Company, Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.

Water.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenburg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Jenkins Bros., New York.

GENERATOR COOLING SYSTEMS.

Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Cooling Tower Co., New York.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

GOVERNORS, (Pump).

Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich.

GRATES

Dumping

Pyramid Iron Products Co., New York.

Rocking

Pyramid Iron Products Co., New York.

Shaking

Pyramid Iron Products Co., New York.

Shaking and Dumping

Pyramid Iron Products Co., New York.

Shaking, Circular

Pyramid Iron Products Co., New York.

Stationary

Pyramid Iron Products Co., New York.

HEAT CABINETS

Trane Co., LaCross, Wis.

HEATERS.

Domestic Water.

Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., No. Tonawanda, N. Y.
American Radiator Co., Chicago, Ill.
Badger & Sons Co., E. B., Boston, Mass.
Burnham Boiler Corp., Irvington, N. Y.
Dahlquist Mfg. Co., Boston, Mass.
Davis Engineering Co., New York.
Excelso Specialty Works, Buffalo, N. Y.
Frank Heating & Engineering Co., O. E., Buffalo, N. Y.
Monitor Boiler Co., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Spencer Heater Co., Williamsport, Pa.
Thermal Appliance Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

Electrical Unit

Ilg Electric Ventilating Co., Chicago, Ill.

Feed Water, (Closed).

Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Frank Heating & Engineering Co., O. E., Buffalo, N. Y.
Griscom-Russell Co., New York.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water, (Open).

Griscom-Russell Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Fuel-oil.

Alberger Heater Co., Buffalo, N. Y.
American Blower Co., Detroit, Mich.
Davis Engineering Corp., New York.
Drying Systems, Inc., Chicago, Ill.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

Air, Fan System.

Aerofin Corporation, Newark, N. J.
American Blower Co., Detroit, Mich.
American Radiator Co., Chicago, Ill.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Drying Systems, Inc., Chicago, Ill.
Johnson Fan & Blower Co., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.

Magazine Feed

Spencer Heater Co., Williamsport, Pa.

Portable Unit Air.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Dwyer Equipment Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Pecco Incorporated, St. Louis, Mo.
Skinner Bros. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa
(See also Ventilators, Portable Unit.)

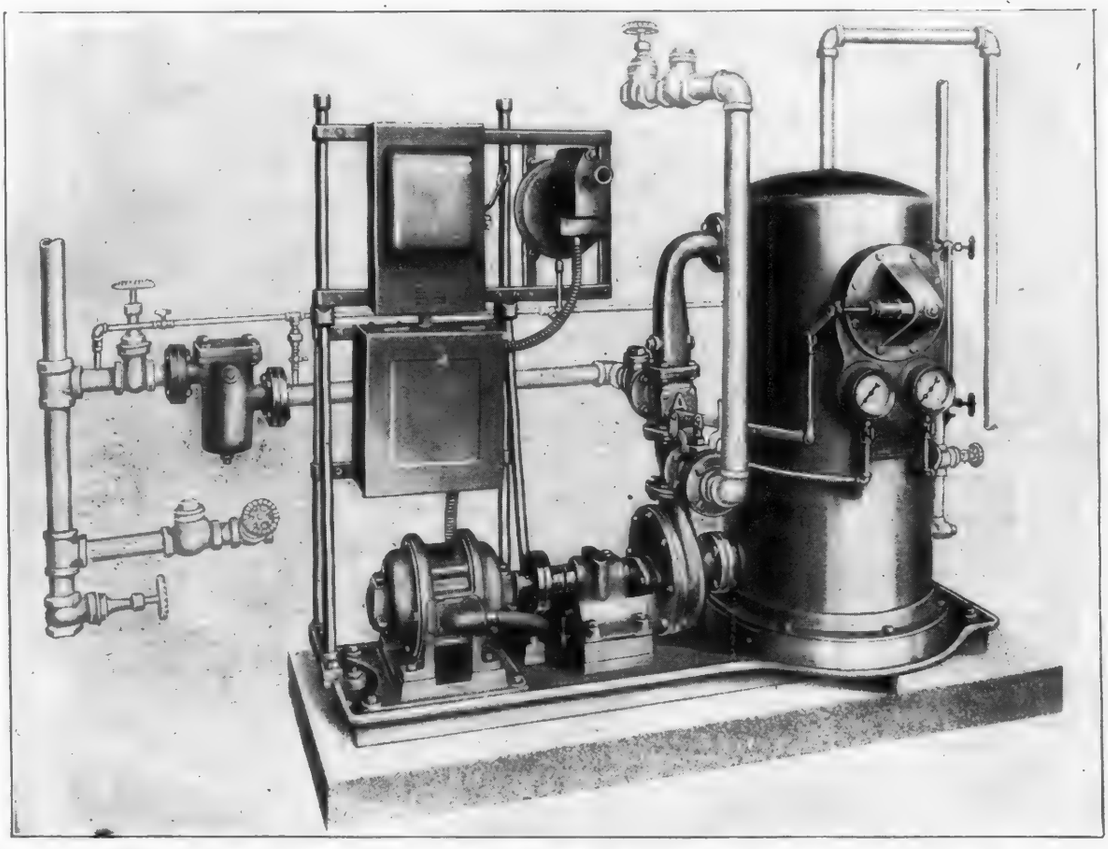
HEATING SYSTEMS.

"Gasteam".

James B. Clow & Sons, Chicago, Ill.

Vacuum.

Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind
Webster & Co., Warren, Camden, N. J.



V1 unit completely equipped with Automatic Vacuum Control, piping connections made and ready for operation. Piping shown in gray tone is installed by contractor. Suction strainer and check valve at inlet of pump are furnished with unit, as well as companion flanges, bolts and gaskets.

YOUNG
CENTRIFUGAL VACUUM AND BOILER FEED
PUMPS

They are Quickly and Easily Installed

Young Pumps are installed with the least amount of labor and expense because they are shipped from the factory as completely assembled units. The electrical equipment is already mounted, ready for connection to the supply lines.

When setting up the pump there are only two principal piping connections to be made and the electrician's only work is to connect the feed wires to the pump switch. The unit is then ready to operate.

Supplied in Standard Units of Seven Capacities

Before being shipped each Young Pump is connected and run for hours under rigid working conditions. Every part must be correct and every bearing perfectly aligned. This careful test insures proper operation the first time the switch is pulled.

Because of their simple, rugged construction Young Pumps may be depended upon to deliver constant uninterrupted service in the hands of the average janitor or boiler fireman.

YOUNG PUMP COMPANY DUNHAM BUILDING
450 E. Ohio Street, Chicago

Factory: Michigan City, Indiana
In Canada; C. A. Dunham Co., Ltd., 1523-41 Davenport Road, Toronto

Young Pumps Have Large Reserve Capacity

ENGINEERS' SPECIFICATION INDEX (Continued)

Vapor.
American District Steam Co., No. Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Haines & Co., Wm. S., Philadelphia, Pa.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane & Co., La Crosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

Water.
Grinnell Company, Providence, R. I.
Patterson-Kelley Co., New York.
Spencer Heater Co., Williamsport, Pa.
Thrush & Co., H. A., Peru, Ind.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Grinnell Company, Providence, R. I.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.

HUMIDITY CONTROL.
American Blower Co., Detroit, Mich.
Atlas Valve Co., Newark, N. J.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Grinnell Company, Providence, R. I.
Klipfel Mfg. Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

INSTRUMENTS
Electric Measuring.
Bristol Co., Waterbury, Conn.
Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

Indicating and Recording.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bailey Meter Co., Cleveland, O.
Foxboro Co., Inc., The Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Sarco Co., New York
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa

INSULATING MATERIALS.
American District Steam Co., No. Tonawanda, N. Y.
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Hornung, J. C., Chicago, Ill.
Johns-Manville, Inc., New York.
Minwool Insulating Co., Toledo, Ohio.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Universal Gypsum Co., Chicago, Ill.
Wyckoff & Sons, A., Elmira, N. Y.

MANOMETERS.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.

MECHANICAL DRAFT APPARATUS.
American Blower Co., Detroit, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park Mass.
L. J. Wing Co., New York.

METERS.
Condensation.
American Dist. Steam Co., No. Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.
Hornung, J. C., Chicago, Ill.
Pearce & Co., W. H., Chicago, Ill.

Feed Water.
Central Station Steam Co., Detroit, Mich.

Feed Water (Wier Type).
Webster & Co., Warren, Camden, N. J.

Flow
American District Steam Co., North Tonawanda, N. Y.
Spray Engineering Co., Boston, Mass.

Pitot Tube.
American Blower Co., Detroit, Mich.

Steam.
American District Steam Co., No. Tonawanda, N. Y.
Foxboro Co., Inc., The Foxboro, Mass.

MOTORS (Electric).
Century Electric Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Lincoln Electric Company, Cleveland, Ohio
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

NOZZLES, SPRAY
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Manufacturing Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Air Conditioning Co. of America, Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., New York
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

OIL BURNERS
Aetna Automatic Oil Burner, Inc., Providence, R. I.
American Nokol Co., Chicago, Ill.
Automatic Burner Corp., Chicago, Ill.
Automatic Home Heating Co., Pueblo, Colo.
Caloroil Burner Corp., New York
Chalmers Oil Burner Co., Minneapolis, Minn.
Combustion Fuel Oil Burner Co., Milwaukee, Wis.
Crosley Radio Corp., Cincinnati, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electrol Incorporated, St. Louis, Mo.
Hardinge Bros., Inc., Chicago, Ill.
Johnson Co., S. T., Oakland, Cal.
Marr Oil Heat Machine Cor., Minneapolis, Minn.
May Oil Burner Corp., Baltimore, Md.
Nu-Way Corporation, Rock Island, Ill.
Petroleum Heat and Power Co., New York.
Rayfield Mfg. Co., Chicago, Ill.
Sunstrand Engineering Co., Rockford, Ill.
Sword & Kimber, Phila., Pa.
Wayne Co., Ft. Wayne, Ind.
Wilde Co., W. B., Peoria, Ill.
Winslow Boiler & Engineering Co., Chicago, Ill.

OIL BURNER EQUIPMENT
Janette Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Monroe Machine Tool Co., Chicago, Ill.
Webster Electric Co., Racine, Wis.

Ignition
Webster Electric Co., Racine, Wis.

OZONE APPARATUS.
Air Conditioning & Engineering Co., St. Louis, Mo.
United States Ozone Co., Scottdale, Pa.

PIPE.
Cast Iron.
Clow & Sons, Jas. B., Chicago, Ill.

Steel.
National Tube Co., Pittsburgh, Pa.

Wood.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE BENDING.
Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Grinnell Company, Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (Wood).
American District Steam Co., No. Tonawanda, N. Y.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE HANGERS.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.

PIPE, POWER.
Grinnell Company, Providence, R. I.

PIPE THREADING & CUTTING MACHINES
Standard Engineering Co., Ellwood City, Pa.

PUMPS.
Centrifugal.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yeomans Bros. Co., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Condensation.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros. Co., Chicago, Ill.

Rotary.
Nash Engineering Co., So. Norwalk, Conn.

Steam.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.

Turbine.
Nash Engineering Co., So. Norwalk, Conn.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yoemans Bros., Chicago, Ill.

Vacuum.
American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Chicago Pump Co., Chicago, Ill.
Du Moin Pump Sales Co., Des Moines, Iowa.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Skidmore Corp., Chicago, Ill.
Trane Co., La Crosse, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

RADIATOR HANGERS.
Frank Radiator Bracket Co., Chicago, Ill.
Gloeckle, Jr., A. F., Rochester, N. Y.
Grinnell Company, Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Company, St. Paul, Minn.
Little Giant Mfg. Co., Minneapolis, Minn.
Pierce, Butler & Pierce Mfg. Co., New York.

RADIATORS.
"Gasteam."
James B. Clow & Sons, Chicago, Ill.

"Gaswater."
Clow & Sons, Jas. B., Chicago, Ill.

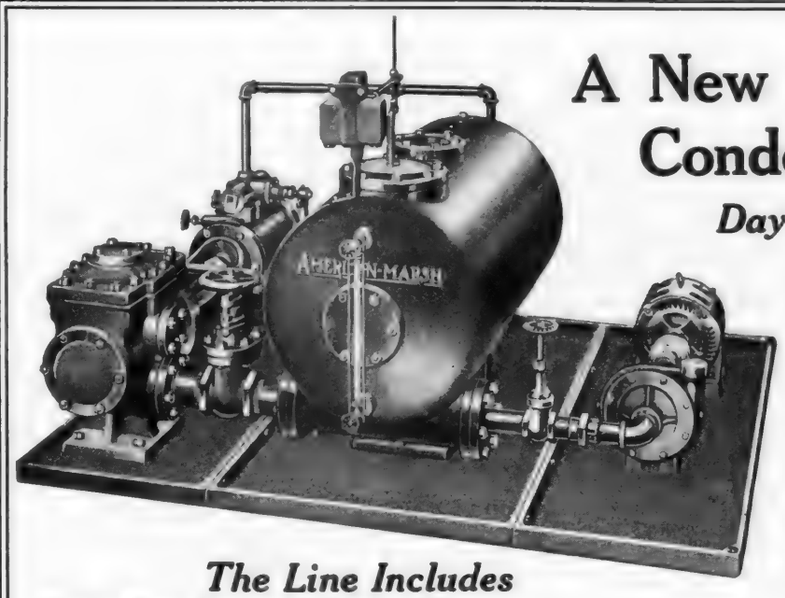
RADIATORS, STEAM AND WATER.
Aerofin Corp., Newark, N. J.
American Radiator Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Gurney Heater Mfg. Co., Boston, Mass.
National Radiator Co., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Co., New York.
Richmond Radiator Co., New York
Spencer Heater Co., Williamsport, Pa.
United States Radiator Corp., Detroit, Mich.

RECEIVERS.
Air.
American District Steam Co., No. Tonawanda, N. Y.
The Brownell Co., Dayton, Ohio.
Kieley & Mueller, Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.

Condensation.
Chicago Pump Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Yeomans Bros., Chicago, Ill.

REGULATORS.
Boiler-Feed.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

Damper.
American Dist. Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
American Radiator Co., Chicago, Ill.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Regulator Co., Chicago, Ill.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Thrush & Co., H. A., Peru, Ind.
Trane Co., La Crosse, Wis.
L. J. Wing Mfg. Co., New York.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.



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Day and Night Service

This new Condensation Pump is designed for use where there is a wide variation in steam pressure. When the steam pump stops operating because of lack of steam pressure a motor driven centrifugal pump, which is controlled automatically, keeps the return lines free from condensation. This is important, for it keeps the return lines clear and continues to operate until enough steam is generated to operate the steam pump. It is really a day and night pump. Practical, efficient and economical.

Write for Bulletin No. 58

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Condensation Pumps, steam and motor driven, vertical and horizontal.
Automatic Boiler Feed Pumps and Receivers.

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ECONOMY Centrifugal Vacuum Pumps used everywhere with good Heating Plants.

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71-122 No. Curtis Street **Chicago, Ill.**

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Non-Return.

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Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Radiator.

American Radiator Co., Chicago, Ill.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Commonwealth Brass Corporation, Detroit, Mich.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Gorton & Lidgerwood Co., New York.
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Illinois Engineering Co., Chicago, Ill
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McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Russell & Co., W. A. New York.
Trane Co., La Crosse, Wis.
Scott Valve Mfg. Co., Detroit, Mich.
Simplex Heating Specialty Co., Inc., Lynchburg, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

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American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Lytton Manufacturing Co., Franklin, Va.
McAlear Mfg. Co., Chicago, Ill.
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Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

Regulating.

American District Steam Co., No. Tonawanda, N. Y.
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Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
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Klipfel Mfg. Co., Chicago, Ill.
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Powell Co., Wm., Cincinnati, Ohio.
Powers Regulator Co., Chicago, Ill.

Relief (Water).

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Safety.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
Powell Co., Wm., Cincinnati, O.

Stop and Check.
(See Valves, Non Return).

VENTILATING HEATERS
Portable Unit.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, Ohio.
Ilg Electric Ventilating Co., Chicago, Ill.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Nelson Corporation, Herman, Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park. Mass.
York Heating & Ventilating Co., Philadelphia, Pa
(See also Heaters, Portable Unit Air).

VENTILATING SYSTEMS

Air Conditioning & Engineering Co., St. Louis, Mo.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Nelson Corporation, Herman, Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

VENTILATORS.

Aeolus Dickinson Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

Mushroom.

Aeolus Dickinson Co., Chicago, Ill.
Knowles Mushroom Ventilator Co., New York.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.
Ventilating Products Co., Chicago, Ill.

WATER STERILIZERS

Air Conditioning & Engineering Co., St. Louis, Mo.

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Metal.

Athey Company, Chicago, Ill.
Chamberlin Metal Weather Strip Co., Detroit, Mich.
Higgin Manufacturing Co., Newport, Ky.

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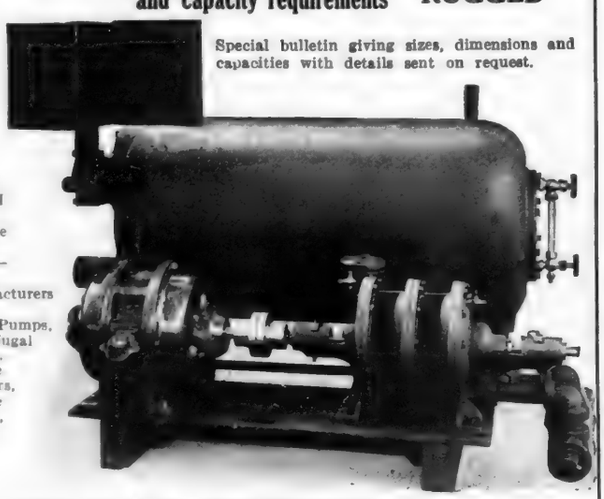
AUTOMATIC ELECTRIC NOISELESS RUGGED

The mark of Dependability

Built for all pressure and capacity requirements



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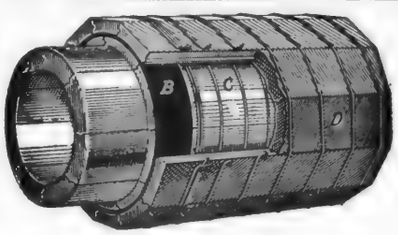

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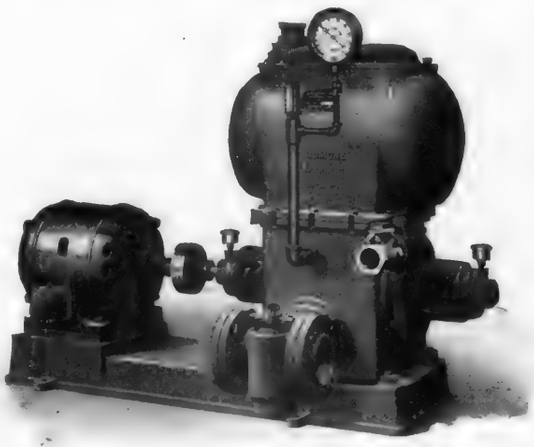

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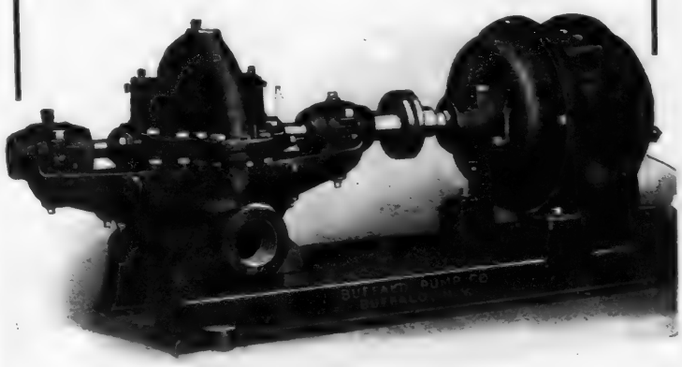
Why not get Bulletin 955 for full particulars as to why large users standardize on "Buffalo"?



Buffalo Steam Pump Co.

480 Broadway, Buffalo, N. Y.

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

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MASONIC TEMPLE
Detroit, Mich.

GEO. D. MASON & CO.
Architects

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Spencer Cleaned

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Hartford, Conn.

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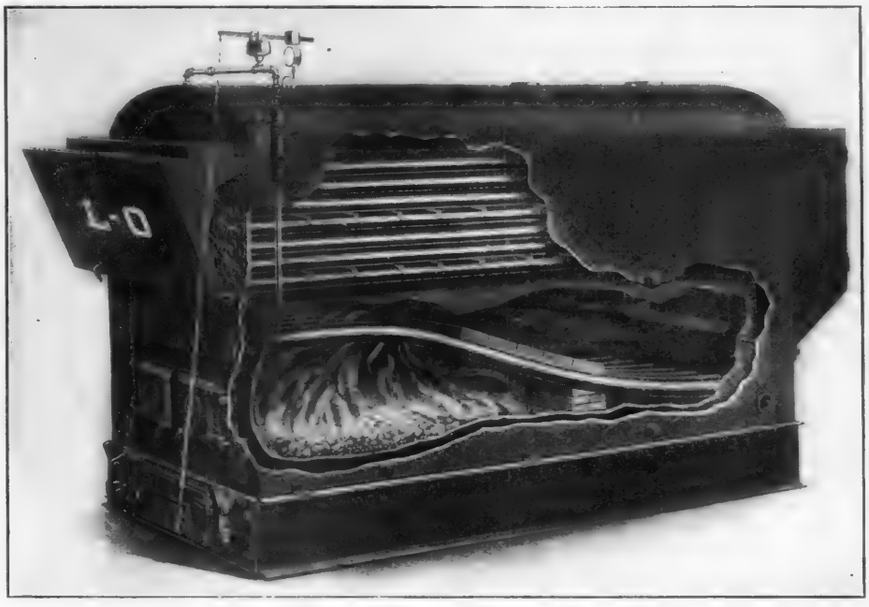

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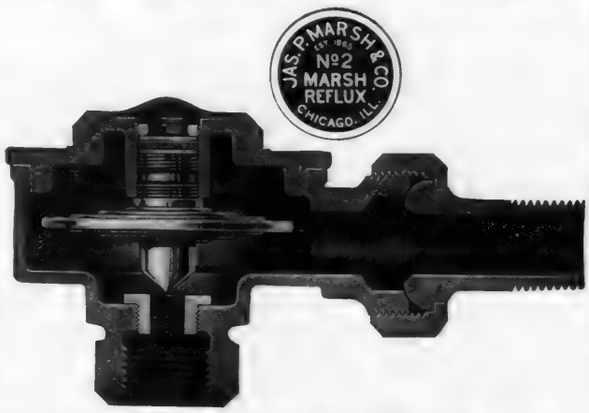
If any Marsh Reflux Trap might develop a defect in material, workmanship or operation inside of five years after date of installation, such Trap would be replaced free of charge.



The Most Economical, Practical and Efficient Trap for the Average Sized Unit

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Automatically discharge air and the water of condensation as fast as it is formed.

The Trap closes the instant steam or vapor strikes the thermostatic diaphragm. Vapor or steam cannot pass through the Trap; therefore every atom of heat is given off in the radiator or coil.

Just one movable part—nothing loose to rattle, chatter or make a noise.

Neat in appearance, handsomely finished and heavily nickel-plated.

The Economical, Practical and Efficient Trap for Both Small and Large Units

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JAS P. MARSH & CO.

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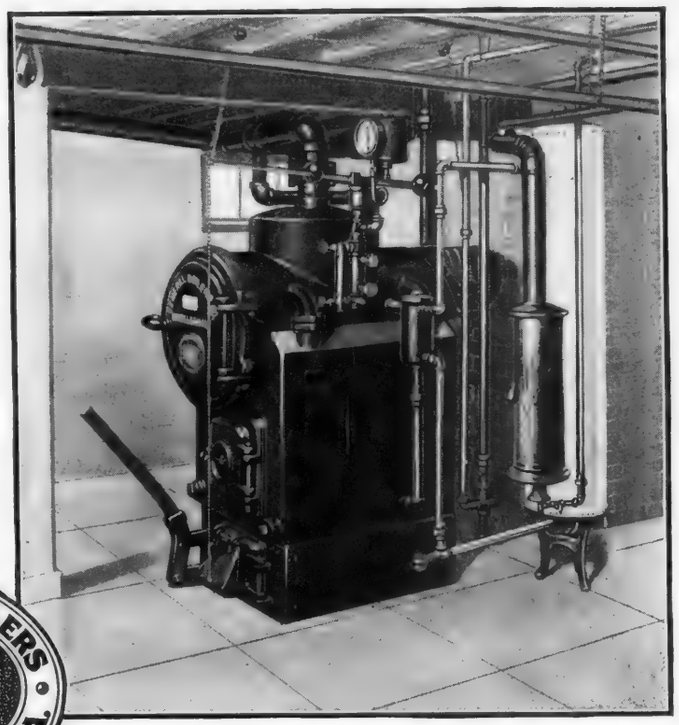

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PACIFIC STEEL BOILER CORP., *Bristol, Pa.*
BRANCH OFFICES IN PRINCIPAL CITIES

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STEEL RESIDENCE BOILERS

Made in three types and fourteen sizes to heat 200 to 2600 gallons of water per hour

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Water Heating Garbage Burners

Make Fuel of Garbage and Rubbish

Every time the garbage man calls he carts away a lot of good fuel—and leaves a host of foul odors behind. Garbage and rubbish contain many heat units. In a Kewanee Water Heating Gargage Burner all this waste matter can be turned into fuel and used for heating water.

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KEWANEE, ILLINOIS

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CINCINNATI,	P. O. Box 75	LOS ANGELES,	306 Crocker St.	SALT LAKE CITY,	204 Dooly Bldg.
CLEVELAND,	Superior Ave., N.E., at 17th St.	MEMPHIS,	1812 Exchange Bldg.	SAN ANTONIO,	502 Calcasieu Bldg.
DALLAS,	1903-4 Santa Fe Bldg.	MILWAUKEE,	440 Barclay St.	SAN FRANCISCO,	635 Mission St.
DENVER,	1226-28 California St.	MINNEAPOLIS,	708 Builders Exchange Bldg.	SEATTLE,	326 Columbia St.
DES MOINES,	707 Hubbell Bldg.			TOLEDO,	415 13th St.

CANADIAN REPRESENTATIVES: Dominion Kewanee Boiler Co., Ltd., 66 Richmond St., East, Toronto 2, Ontario

Gurney

Makes a Big Difference

A Practical Heater

Pleasant expressions and colorful promises mean little to the level-headed Heating Contractor, or Builder or Architect. A Gurney Boiler doesn't need words. Actual figures on performance are everywhere to be found. One way to get them quickly is to write us. Another is to ask those who have depended upon Gurney Boilers for years.

The Essex No. 19 Steam Boiler is pictured here

GURNEY HEATER M'F'G COMPANY
GENERAL OFFICES, BOSTON, MASS.
93-97 OLIVER STREET, FORT HILL SQUARE

GURNEY HEATER CO., INC.
NEW YORK
MANLY ST. COR. ANABLE AVE.,
LONG ISLAND CITY

GURNEY HEATER M'F'G CO.
RICHMOND, VA.
418 EAST MAIN STREET

GURNEY HEATER CO., INC.
PHILADELPHIA
108 NORTH 17TH ST.

Apartment at 1440 E. 52nd St., Chicago. The heating plant is equipped with a Wolff Draft Conditioner.

Wolff Draft Conditioners

Above is another of Chicago's fine apartment buildings which is heated with a *good* boiler, and equipped with a Wolff Draft Conditioner.

No matter how fine a boiler may be in producing heat, it can't be efficient **unless the heat it makes is used.**

By conditioning the chimney to the boiler, Wolff Draft Conditioners hold the hot gases in the boiler until the water has a chance to absorb them. They actually save anywhere from 25% to 33% of the fuel (either coal or oil) which would otherwise be used.

That's why some 5500 buildings in Chicago, which are heated with the best boilers made, found it worth while to also use Wolff Draft Conditioners.

There's money for you in selling and installing them

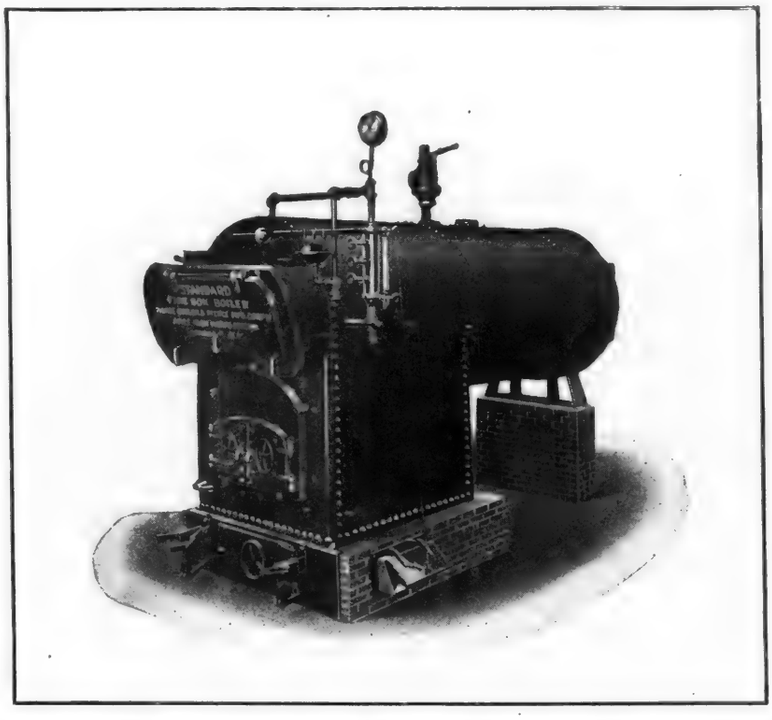
Well rated concerns, or financially responsible individuals, who can sell to architects and building owners can make money with Wolff Draft Conditioners. Some choice territory still unassigned.

Write us for particulars.

Wolff Coal Saver Co.

1336 West Congress St. **Chicago**

AMES



FIREBOX HEATING BOILERS

AMES IRON WORKS

Division of

PIERCE, BUTLER & PIERCE

MANUFACTURING CORPORATION

Main Office and Works

OSWEGO, N. Y.

General Sales Offices

41 EAST 42nd STREET, NEW YORK CITY

Last Year, This Year - Next Year - Always!

SINCE 1841, heaters manufactured by the International Heater Company and its predecessors, have been nationally known as high quality equipment, assuring consistently high quality to buyers.

This year marks a still further advance in the establishment of **guaranteed ratings** for every International boiler. These guaranteed radiation loads, adopted following exhaustive research tests extending over many months, are endorsed by leading contractors and backed by the entire resources of the International Heater Company.

Next year the same high standards will be maintained. International Boilers may be improved in design but they will always be subjected to rigid standards of manufacture and careful inspection. They are favorably known because they deliver 98% dry steam without a header and are very economical in operation.

These precautions, which insure full value heating equipment at reasonable prices, will be followed out as carefully as they were originally established. There will be high International quality available to you—

Always!

SUPPORTING F&B MEMBER

Ask for Hard Coal catalog 1746-H or Smokeless catalog 1751-H.

INTERNATIONAL HEATER CO.

Utica, N. Y.

New York Chicago Cleveland Philadelphia
Detroit Nashua, N. H.

Canadian Distributor: Heating Supplies, Ltd.
902 Home Street, Winnipeg, Man.

Date.....

INTERNATIONAL HEATER CO.
UTICA, N. Y.

Please mail me a copy of the new INTERNATIONAL BOILER DATA BOOK.

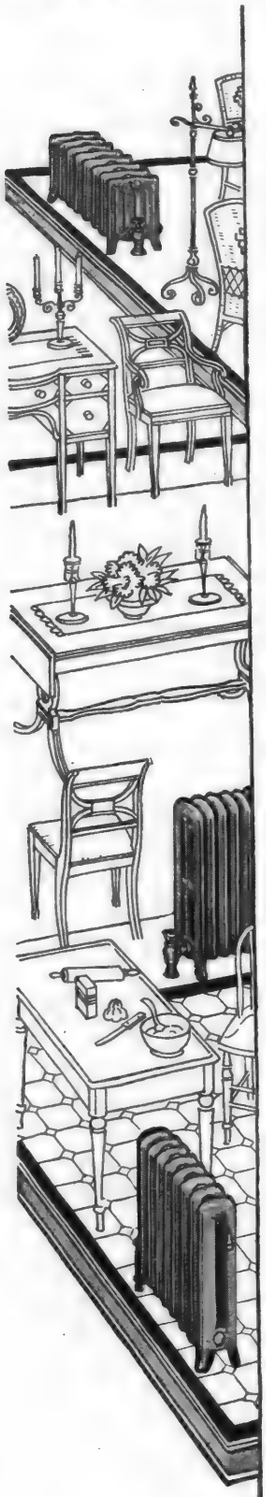
Name .....

Street No. .....

City and State .....

H-12-26.

DEPENDABLE HEAT ALL OVER THE HOUSE WITH ECONOMY



Not only the boiler, but also heating-comfort —GUARANTEED

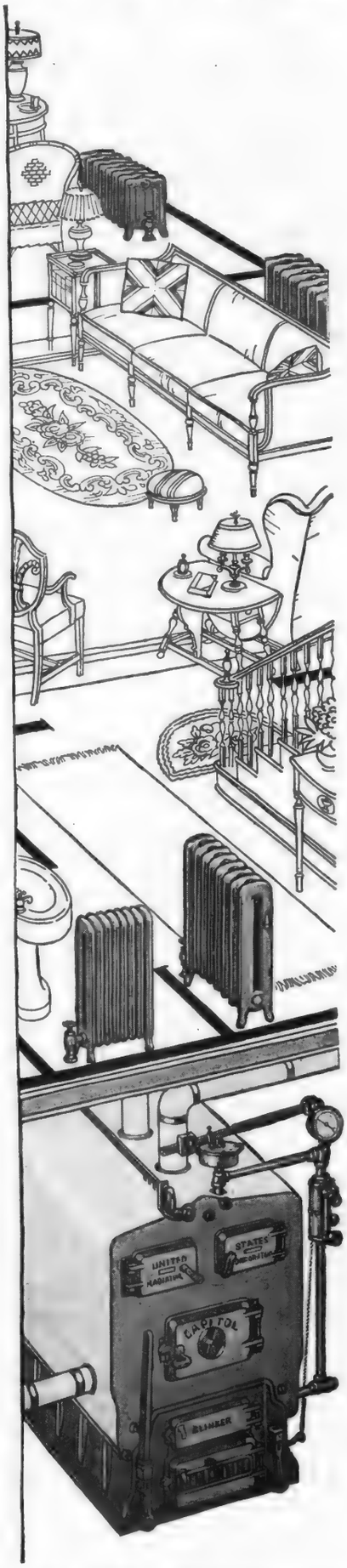
Most guarantees are only promises to replace defective parts. Good as far as they go.

But Capitol *guaranteed heating* is a remarkable, new-type guarantee, a definite, non-quibbling guarantee of results. It guarantees not only parts, but performance. It is a complete and broad warrant of heating satisfaction and comfort—in writing. For if any Capitol boiler under stated conditions fails to heat satisfactorily its full published amount of cast iron radiation, the necessary additional capacity is supplied without charge.

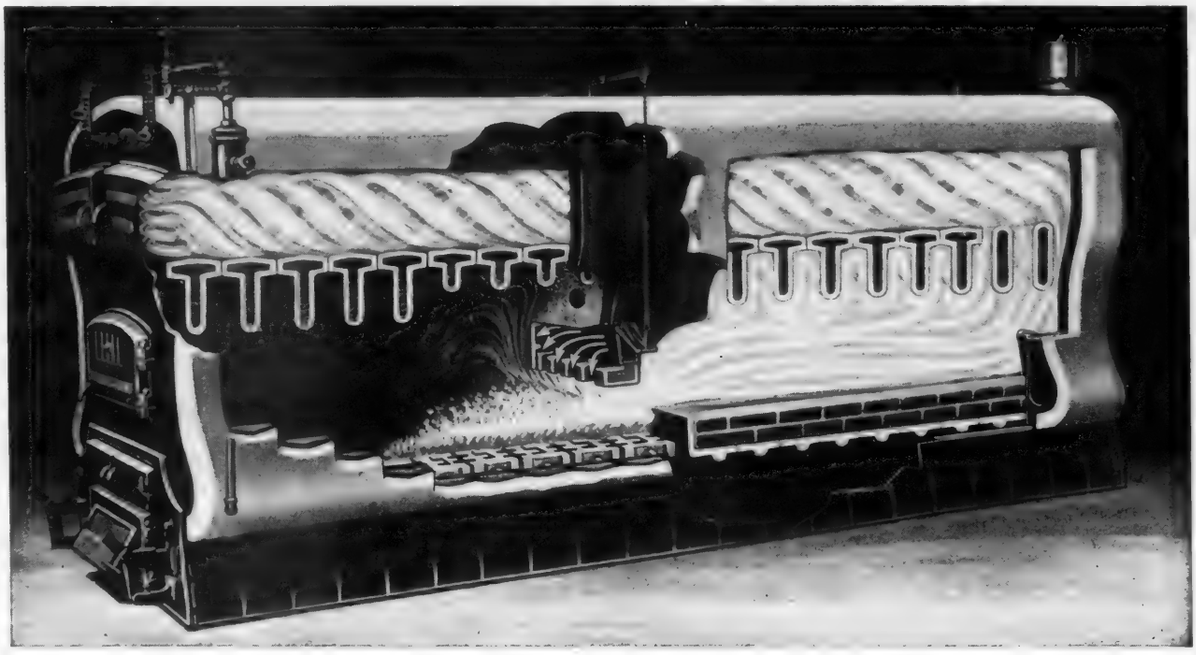
Thus all uncertainties about boiler sizes are banished. Thus, when you specify or install nationally-advertised Capitol *guaranteed heating*, you do more than supply quality materials. You guarantee quality results. Write for detailed information.

United States Radiator Corporation
DETROIT, MICHIGAN
6 FACTORIES AND 28 ASSEMBLING PLANTS SERVE THE COUNTRY
For 36 years, builders of dependable heating equipment

Capitol Boilers
and
UNITED STATES RADIATORS



SUPPLIED AND INSTALLED NATIONALLY BY ESTABLISHED HEATING CONTRACTORS



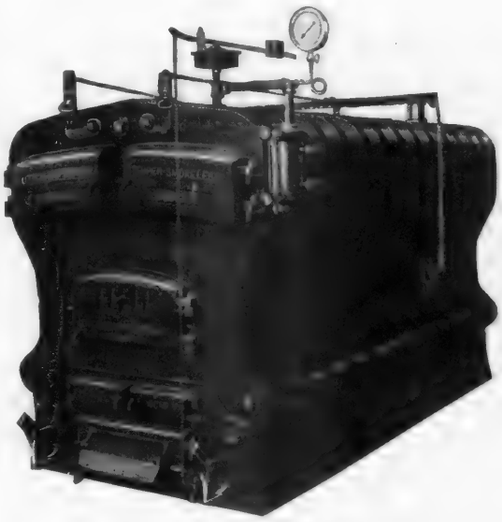
Cutaway View of Utica-Imperial SUPER-SMOKELESS Boiler

UTICA-IMPERIAL

SUPER-SMOKELESS BOILERS

Insurance Against the Fuel Situation

A recent improvement put the Air Regulation under easy control from the front of the boilers.



Exterior View of Boiler

Utica-Imperial SUPER-SMOKELESS Boilers will not only burn soft coal and fuel oil with the utmost efficiency, but will, when required, utilize other types of available fuel, thus protecting the owner against any emergency, and providing an insurance against the fuel situation. In these days of high fuel costs, it is of the utmost importance that heating boilers should be able to utilize the cheapest available fuel. Utica-Imperial SUPER-SMOKELESS Boilers will burn even the cheaper grades of soft coal not only smokelessly but with maximum efficiency, and will utilize other fuels with great economy and efficiency.

Manufactured by the

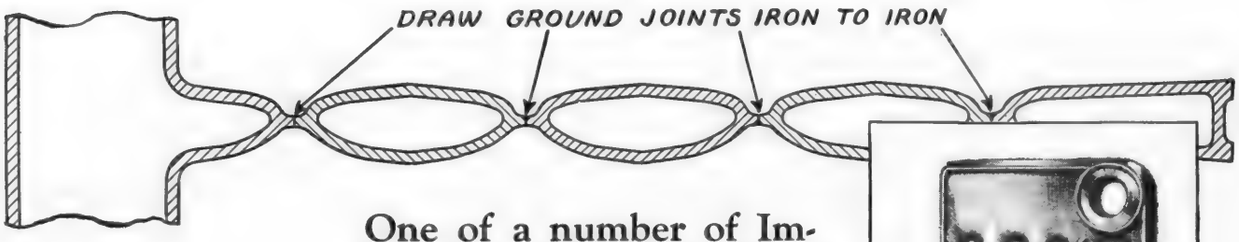
UTICA HEATER COMPANY

"Pioneers in Smokeless Combustion"

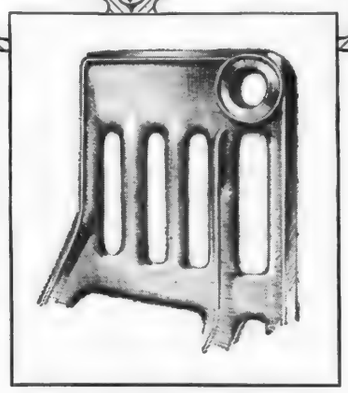
UTICA, NEW YORK

CHICAGO CLEVELAND NEW YORK

Sales Offices in the Principal Cities



One of a number of Important Spencer Heater Features that save money, labor, time and servicing for the Heating Contractor.



Number 2

All Spencer Sectional Heaters Have Ground Joints

THIS important feature makes an air-tight connection possible with least assembly labor and does away with the necessity for cements and putties, a worthwhile saving in itself.

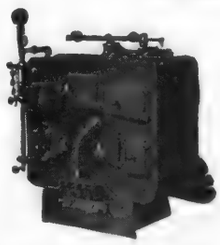
Ground joints as developed in the Spencer design also overcome the action of rust and corrosion between sections, as well as the short circuiting of gases. Combustion and heat absorbing efficiency are higher.

These points, which mean fuel economy and heater satisfaction for the building owner, build up good will for you.

The generally accepted cause of the cracking of cast iron boilers during a period of idleness, is the wedging action of rust between sections. This condition is prevented by the unique Spencer Section Design.

Spencer Junior Hot Water Heater—capacity in direct cast iron radiation equivalent, water, 300 to 600 square feet.

Spencer No. 1 Single Grate Heater, capacity in direct cast iron radiation equivalent, water, 800 to 1450 square feet; steam or vapor, 500 to 900 square feet.



Spencer No. 2 Double Grate Heater, capacity in direct cast iron radiation equivalent, water, 1750 to 3800 square feet; steam, 1100 to 2350 square feet.

Spencer
steam, vapor or hot water
Heaters
burn No. 1 Buckwheat coal

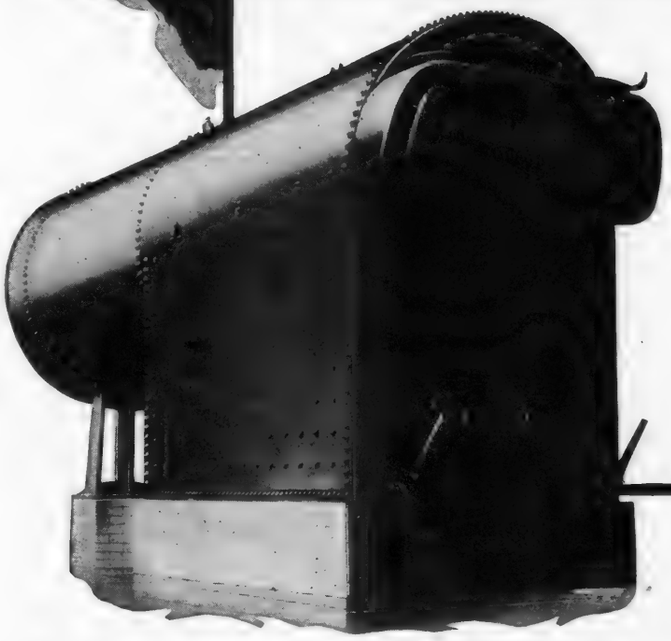
SPENCER HEATER COMPANY *General Offices:* WILLIAMSPORT, PA.

New York Boston Philadelphia Baltimore Buffalo Rochester Hartford Detroit Albany Syracuse Harrisburg Scranton

Division of Lycoming Manufacturing Company

In the Ruskin Apartments,
Pittsburgh, Pa.

TITUSVILLE ~ TICO SMOKELESS BOILERS



IN

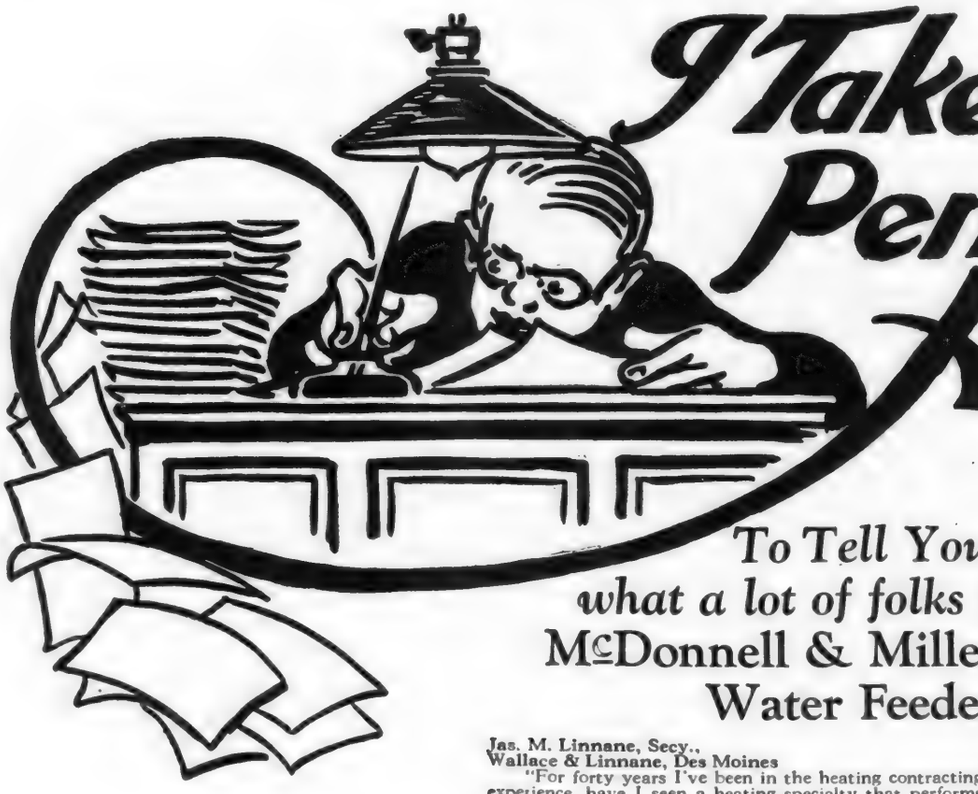
The Ruskin apartments—one of the ultra modern apartment hotels that is meeting with remarkable success not only in Pittsburgh, but in other cities throughout the country—and in which Tico Smokeless Boilers are proving most satisfactory for heating purposes.

Write for our Catalogue No. 85

TITUSVILLE IRON WORKS CO.
TITUSVILLE, PENNA.

Sales Offices:

New York, N. Y. 183 West 42nd Street
Pittsburgh, Pa. Farmers Bank Bldg.
Buffalo, N. Y. Marine Trust Bldg.
Detroit, Mich. No. 833 Washington Blvd. Bldg.
Washington, D. C. Woodward Building
Chicago, Ill. 1124 Harris Trust Bldg.



I Take My Pen in Hand

To Tell You what a lot of folks think of McDonnell & Miller Duplex Water Feeders

Jas. M. Linnane, Secy.,
Wallace & Linnane, Des Moines
"For forty years I've been in the heating contracting business and never in all my experience, have I seen a heating specialty that performs better than that contraption of yours."

S. L. Haas, Pres.,
Advance Heating Co., Chicago
". . . all the numerous Duplex Water Feeders of your manufacture installed by us are satisfactorily serving our clients, and we are recommending the installation of the feeder in connection with each steam boiler installed by us.
"We consider that the owner is amply compensated for the initial cost of the feeder by the assurance that his boiler has not only an ample but a proper supply of water at all times through the combination of the overflow feature with the water feeder device."

J. P. Baldwin, Chicago
"When we install your Duplex Water Feeder on a job, we feel that we have given our customer the very best kind of boiler insurance."

J. W. Brookhardt, Supt.,
Alabama Supply Co., Birmingham
"We are pleased to say that they have in every instance performed the duties for which they are designed."
In reference to an installation on a 36-inch twelve-section boiler which had been cracked, Mr. Brookhart says, "In less than a week after the Feeder was installed, a fuse blew out on the pump and had it not been for the McDonnell & Miller Duplex Water Feeder, we feel sure the entire boiler would have been lost again."

C. W. Johnson, Pres.,
C. W. Johnson, Inc., Chicago
"Dependable water feeders are, in our opinion, a necessary part of any low pressure steam heating system using power-driven pumps or oil burners, and yours have proven **Dependable.**"

M. E. Becker,
E. J. Febrey & Co., Washington, D. C.
"We like your Feeders very much and, wherever possible, we install one."

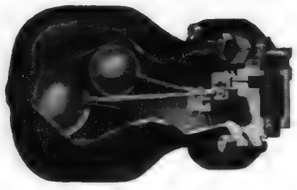
George Hughes,
Hughes Bros., Upper Darby, Pa.
"It is with pleasure that we recommend the McDonnell & Miller Duplex Water Feeder as we have used several and they have proven very successful. We have had no complaint or trouble of any kind."

F. C. Webb,
Webb Oil-O-Matic Sales & Service, Gary, Ind.
"We are highly pleased with the results delivered by your Water Feeder. Our customers are thoroly sold on this product and each installation is giving satisfaction."

M. R. Carpenter,
Latourrette-Fical Co., Sacramento, Calif.
"We have used a considerable number of the McDonnell & Miller Duplex Water Feeders and find them to be first class equipment and will do all they are represented to do."

Edward G. McAllister,
The J. Frank Boyer P. & H. Co., Norristown, Pa.
"The McDonnell & Miller Duplex Water Feeders that we have installed have always worked perfectly."

You can take the word of these heating contractors for the dependability of McDonnell & Miller Duplex Water Feeders. It's easy to convince your customers—old and new—that boiler protection is cheaper than boiler repairs.



THE McDonnell & Miller Duplex Water Feeder is applicable to **any** low pressure steam boiler. Its function is to maintain a constant boiler water line under all conditions. When make-up water is needed, it supplies it from the city mains and when too much excess condensate is returned from the system, it disposes of it by means of the overflow valve.

On pump jobs, the Duplex Water Feeder assures protection against low water in case the current is cut off or, for any reason, the pump does not operate.

The McDonnell & Miller Duplex Water Feeder is a dependable boiler protection unit to guard your customers against the results of forgetting the boiler water line.

"If you keep the boiler line where it belongs, there can be no burned boilers or cracked sections."

McDonnell & Miller

M&M BOILER CONTROLS

General Offices • WRIGLEY BUILDING • CHICAGO ~ Warehouse Stock • BUSH TERMINAL • BROOKLYN

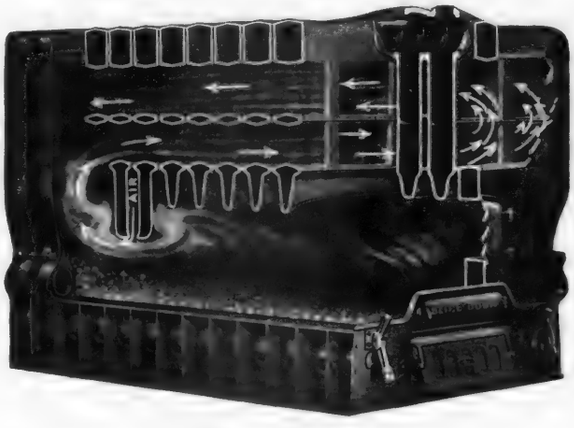
PAGE BOILERS

For Burning Fuel Oil

Oil can be burned most economically in Page Boilers.

Recognized for exceptionally advantageous

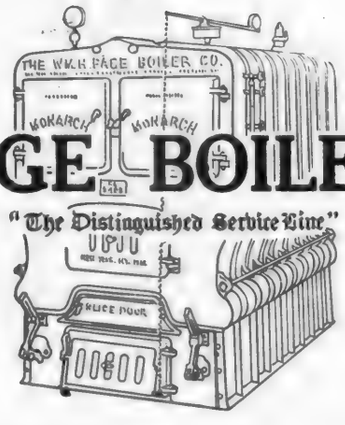
Volunteer (cutaway)



Monarch Smokeless

arrangement of heating surface and specified by foremost Oil-Burner Specialists for many installations.

Our new catalog with Page Guaranteed Safe Ratings and Price list will be of interest to you.



PAGE BOILERS

THE WM. H. PAGE BOILER CO.

200 Madison Avenue
NEW YORK

BOSTON
PHILADELPHIA

CLEVELAND
MEADVILLE

Established 1856

Incorporated 1876

COIL

STEEL HEATING BOILERS AND WATER HEATERS

FOR OIL BURNING

Equally Efficient with Coal

Note Following Points:

1. The large combustion chamber assures an almost perfect ignition of the gases.

2. The amount of heating surface per unit of rating is exceptionally high and it is tremendously effective because it is "within view" of the flame, hence, capable of absorbing the radiant heat.

(These two points are of utmost importance not only to coal users, but particularly to Oil Burner users.)

3. The coils and shell not only get the benefit of the radiant heat, but, as heat rises through coils it must pass (or sift) outwards through and over the coils to the shell before reaching draft spaces at edge of baffle which lays flat on coils. Because of the large amount of heating surface the heat must pass through and over, unusually low flue temperatures are obtained.

4. The Coil Boiler being made of steel will not crack under strain of rapid temperature changes.

Write for interesting testimonials showing savings in oil (and coal) running from 25% to 40%

If desired, the Coil Boiler can be fitted with grates, etc., in thirty minutes' time.

MONITOR BOILER COMPANY

1505 RACE STREET

PHILADELPHIA, PENNA.

Hotel Statler, Boston, Mass., 1300 rooms, 1300 baths.
Architect, Geo. B. Post & Son; Consulting Engineers, Tenny & Ohmes: Electrical Engineer, Karr Parker; Heating Contractors, J. W. Danforth Co.; Blower Company, B. F. Sturtevant Co.

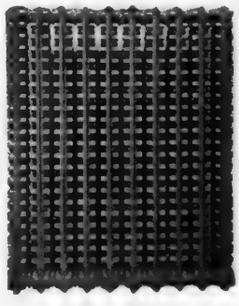
In the newest Statler Hotel—

VENTO CAST IRON HEATERS

In the new Hotel Statler in Boston, Vento Cast Iron Heaters will furnish perfect warmth.

Vento was chosen for this installation because under every kind of test Vento Heaters proved so dependable. They are becoming more and more popular because they bring so many advantages and yet cost less. They are permanently tight—do not wear out, do not leak—and they withstand all the unusual conditions found in heating and ventilating, cooling, air washing, humidifying and drying processes.

We shall be glad to send you our "Engineers' Data Book on Vento," in which are tables showing the results of the most thorough tests ever applied to Blast Heaters.



A typical stack of Vento Cast Iron Heaters

AMERICAN RADIATOR COMPANY

Showrooms and sales offices: New York, Boston, Providence, New Haven, Newark, Philadelphia, Baltimore, Washington, Richmond, Buffalo, Pittsburgh, Cleveland, Detroit, Cincinnati, Atlanta, Chicago, Milwaukee, Indianapolis, St. Louis, St. Paul, Minneapolis, Omaha, Kansas City, Denver, San Francisco, Los Angeles, Seattle, Toronto, London, Paris, Milan, Brussels, Berlin

Makers of IDEAL BOILERS *and* AMERICAN RADIATORS *and other products for heating, ventilating and refrigerating*

BARBER PATENTED JET GAS BURNERS

The Round Boiler illustrated above, shows properly installed a No. 3-R-17 Barber Patented Jet Burner.

Cut gas bills 25 to 40%.
Act as their own pilot lights.
Can be controlled by any good thermostat.
Develop 1960° F. with 500 B. T. U. gas.
Are immune to corrosives and condensates.
Never back-fire or deposit carbon on any pressure.
No adjustment, regardless of pressure or quality of gas.
Orange-green flame with any commercial gas.

DISTRIBUTORS

Correspondence invited from Business Men of standing and financial responsibility as to our policy and exclusive contract. An opportunity to build a permanent and profitable business. Knowledge of domestic Heating problems desirable.

For Greater Efficiency of Heating Appliances

There is a Barber burner to fit any heating appliance, regardless of its type and size. Whether it be a steam, vapor, hot water or air appliance, it can be equipped with Barber units that will greatly increase its efficiency and reduce its operating cost to a minimum. There are Barber burners adaptable to domestic and industrial heating appliances. We can equip any size water-heater, average house heating furnaces, or large, sectional steam or hot-water boilers, as well as various other units.

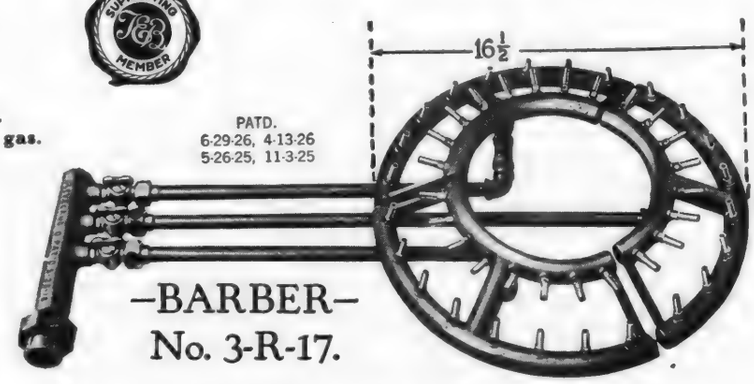
Very high efficiency and economy are assured because the burners are designed to meet the requirements of each particular installation, effecting an even and proper distribution of intense heat from the lowest practical point of installation.

Barber burners are being adopted by the leading manufacturers of Hot Water Heaters, Gas Furnaces, Boilers and Heating Appliances.

We are ready at all times to co-operate with manufacturers of gas appliances in an effort to attain a greater degree of efficiency for them through the installation of Barber patented jet gas burners. This service involves no obligation or expense.

Let us send complete information.

SUPPORTING T&B MEMBER



–BARBER–
No. 3-R-17.

The CLEVELAND GAS BURNER & APPLIANCE CO.

Burner Specialists

3702-04 Superior Avenue, Cleveland, Ohio

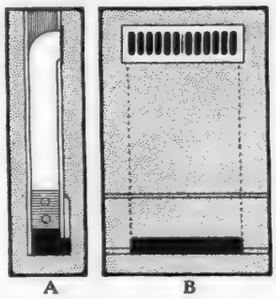
How Reuben N. Trane's Vision Revolutionized Heating

Reuben N. Trane
President
The Trane Company

—the story of today's outstanding success in the heating industry

Less than a year ago, the announcement by Reuben N. Trane of a new type of heating unit, created a sensation in the heating field. The trade was waiting for this achievement and quickly responded. Over 1200 orders poured in almost over night —before a single sample had been sent out.

The overwhelming success of Trane Heat Cabinets is founded on simple principles, known to all heating men and now applied by Reuben N. Trane in a practical way to produce better, quicker heating and more beautiful rooms.



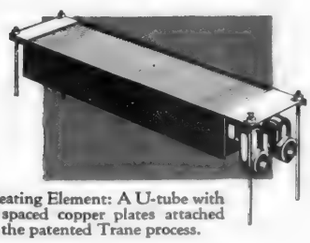
A B

(A) Cross section view of Trane Heat Cabinet as installed in the wall. Air inlet and heating element at bottom, air outlet at top.

(B) Front view of the finished installation. Only the inlet and outlet are visible. Dotted lines indicate position of Cabinet in the wall.

Write today, let us send complete information regarding this revolutionary change in heating methods.

THE TRANE COMPANY
ESTABLISHED 1885
LA CROSSE WISCONSIN



The Heating Element: A U-tube with closely spaced copper plates attached by the patented Trane process.

TRANE
HEAT CABINETS
Successors to the Radiator

Baker Building, Minneapolis, Minn. G. M. Orr, Mechanical Engineer. Larson & McLaren, Architects. Huston & Company, Heating Contractors.

First Choice for the Big Heating Installations

The Baker Building, Minneapolis, is typical of large modern buildings in which Trane Bellows Traps and Trane Bellows Packless Valves are specified by leading architects and engineers.

Here, 527 Trane Traps and 495 Trane Valves were used in the main building, together with 43 Trane Traps and 42 Trane Valves in the garage shown at the left of the picture.

Long experience has taught the heating world that Trane equipment can be depended upon for continuous, efficient operation on the largest projects. A Trane job is right—or Trane makes it right. Every unit is fully guaranteed.

Write for Bulletin 14.

THE TRANE COMPANY, 206 Cameron Avenue, La Crosse, Wis., manufacturers of vapor and vacuum heating specialties, Heat Cabinets, and pumps. Branches and sales connections at New York, Chicago, Boston, Cincinnati, Newark, Philadelphia, Buffalo, Cleveland, Detroit, Seattle, Los Angeles, Albany Minneapolis, Greensboro, N. C., New Orleans, Kansas City, Mo., Zanesville, Ohio, Tampa, Fla., Baltimore, Md., Des Moines, Ia., New Haven, Conn., Sheboygan, Wis. In England: 22-23 Clerkenwell Close, London, E. C. 1. In Canada: The Trane Company, 23 River Street, Toronto, 2; Thomas Robertson & Company, 134 Craig Street, West, Montreal; F. S. Murdoch, 4 St. Elmo Block, Colony St., Winnipeg; In Japan: Mitsubishi Shoji Kaisha, Ltd., Thermal Supply Department, Tokyo. In China: C. J. Doughty & Company, 30 Brenan Road, Shanghai.

TRANE

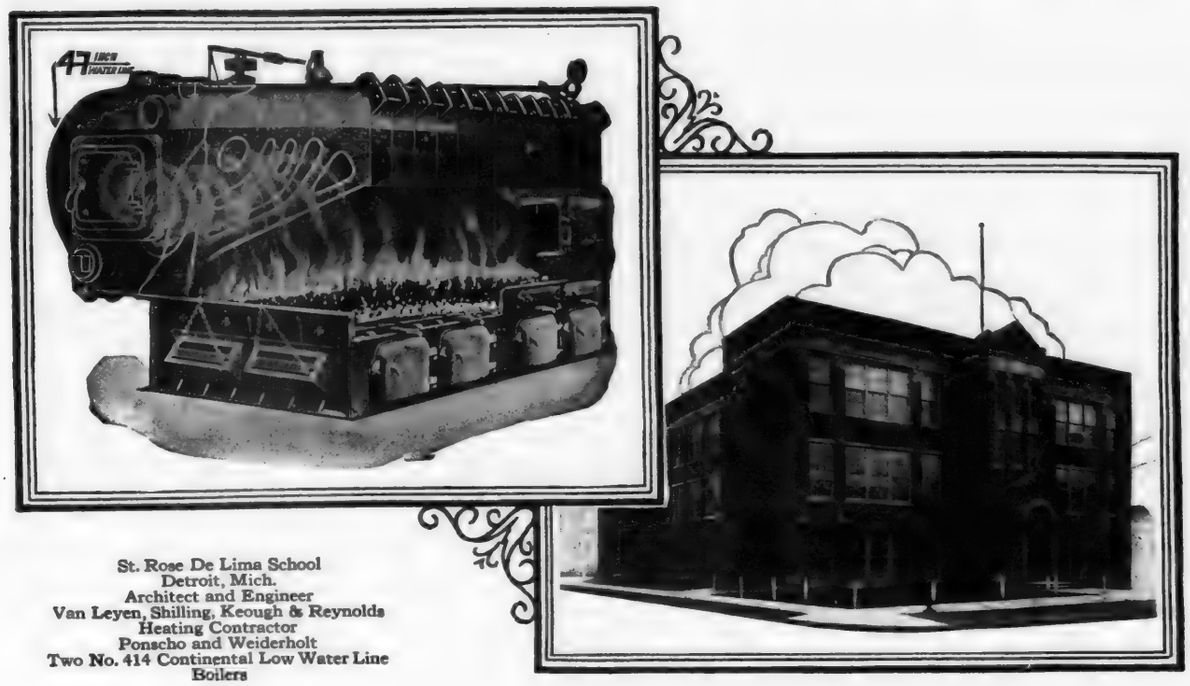
HEATING SPECIALTIES

Trane Bellows Radiator Trap

Trane Bellows Packless Valve

Continental

BOILERS & RADIATORS



St. Rose De Lima School
Detroit, Mich.
Architect and Engineer
Van Leyen, Shilling, Keough & Reynolds
Heating Contractor
Ponscho and Weiderholt
Two No. 414 Continental Low Water Line Boilers

Meeting the Unusual Requirements of School Heating in Detroit with Continental Low Water Line Boilers

GONE are the days of the little red schoolhouse and the sheet-iron stove. The designers of the St. Rose De Lima School in Detroit planned the heating plant as carefully as they planned the building. Here are five of the reasons why they specified two Continental Low Water Line Boilers—

1 They are quick steamers—warm rooms when school opens.
2 They are easy to fire—and leave the janitor free for other duties.
3 They hold a steady water line—no priming.
4 Their low 43″ and 47″ water lines eliminate expensive and refuse-gathering pits.
5 They are thoroughly reliable—important in maintaining health and attendance.

School heating has some unusual requirements. Continental Low Water Line Boilers are meeting unusual as well as usual requirements throughout the world. You will enjoy doing business with Continental.

Continental Heater Corporation
Home Office and Factory
Dunkirk, N. Y., U.S.A.
Detroit Office, 400 Penobscot Building

Built for better heating

Into this Great Hotel went 33 Miles of "NATIONAL" Pipe!

There can be no chance of anything but reliable materials being specified in a magnificent building like this. Far-famed architects and engineers, formulating rigid specifications which demand the highest in quality and endurance, do not substitute any other factor for dependability. No better proof of high quality manufacture and satisfactory service could be given than the specification of "NATIONAL" Pipe in structures like this one. The necessity here is for modern pipe to meet modern conditions—pipe that is manufactured by exclusive processes to insure reliability where millions of dollars have been spent for beauty and comfort—where thousands of tenants may depend without fail on water, steam, gas and air lines.

Thirty-three miles of uniform, strong, durable, ever dependable "NATIONAL" Pipe will faithfully serve in this building for years to come—a satisfaction to all concerned.

"NATIONAL" Pipe is made by the largest manufacturer of wrought pipe in the world —the only pipe that is Spellerized and made Scale Free.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

DISTRICT SALES OFFICES IN THE LARGER CITIES

Between Oil and Comfort

there should be economy

An efficient oil burner cannot be effective unless it is used in connection with a boiler that will absorb and transmit the heat units economically.

ROSS BOILERS

are so designed that the highest degree of economy can be obtained when an oil burner is used.

The combustion chamber contains an unusual amount of volume and the water tubes are so inclined as to speed up circulation which increases the efficiency and prevents the deposit of sediment.

ROSS Boilers are so shaped that they may be installed in the average home without making an opening in the wall or widening the basement door.

There are many other features of superiority.

Write for catalog.

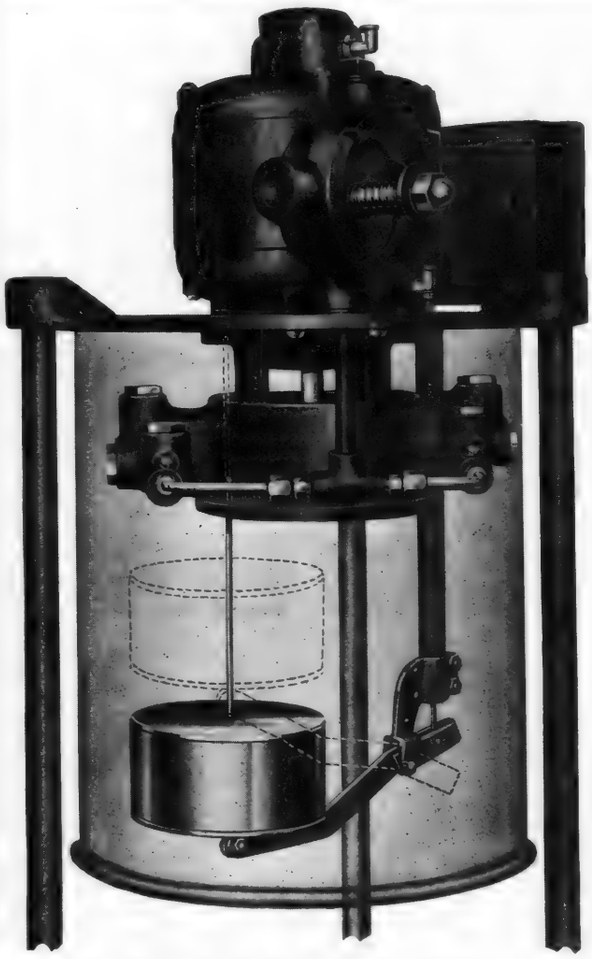
Frost Manufacturing Company

Since 1851

Main office and works:
1526 Henderson St., Galesburg, Ill.

BRANCHES:

15 Park Row, New York, N. Y.
962 E. 37th St., Brooklyn, N. Y.
2126 Edmondson Ave., Baltimore, Md.
1424 Fairmount Ave., Philadelphia, Pa.
1748 Louis Ave., Milwaukee, Wis.
2309 Union Central Bldg., Cincinnati, Ohio
112 W. Adams St., Chicago, Illinois
316 Glencoe Bldg., Duluth, Minn.
Peoria, Illinois
943 Syndicate Trust Bldg., St. Louis, Mo.
2604 Fourth Avenue at Grand River, Detroit, Mich
478 Rockerfeller Bldg., Cleveland, Ohio



MONROE Oil Pump

TYPE TJ

This pump is backed by sixteen years of pump manufacturing experience. It can be depended on to operate effectively and silently. It is guaranteed for five years and its performance is such as to relieve the dealer of all pump service troubles and assist the manufacturer of oil burners in the sale of his product because of the better performance of the equipment. Write for folder.

$75 LIST

MONROE OIL STRAINER

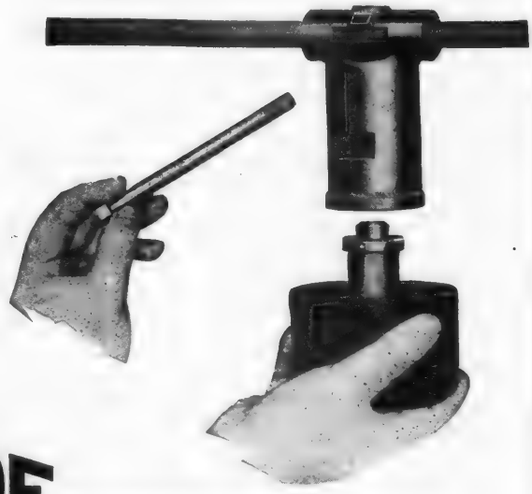
List Price

$5.50

—No leaks
—Easy to clean
—Won't spill oil
—No gaskets
—No drain plugs
—Extra large and strong

Write today for folder

LISTED AS STANDARD BY THE Underwriters Laboratories



Ask for Prices

MONROE MACHINE TOOL COMPANY

NEW YORK SINGER BUILDING 149 BROADWAY

737 W. Jackson Blvd. — CHICAGO

16 YEARS EXPERIENCE MANUFACTURING PUMPS

PHILADELPHIA 437 REAL ESTATE TRUST BUILDING

Note Simple Operation

CHICAGO too favors AERO — The Radiator Vogue

In these two apartments, among the finest in Chicago, Aero Radiators were given the preference.

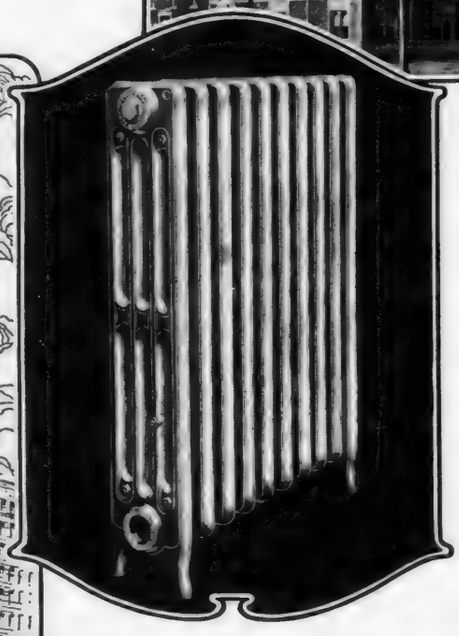
This merely points the way and strengthens the contention that Aero, the most approved of all new style radiation, has become *The Radiator Vogue.*

Manufacturers, throughout the country, are scrapping millions of dollars worth of equipment in an effort to produce a radiator similar in type. In fact, so popular has the Aero Radiator proven, its name has become synonymous of all so-called new style radiators.

If you want a radiator you can use on every job and stand back of—if you want a beautiful, graceful, slender radiator that has a tremendous sales appeal and is readily acceptable everywhere—if you want a radiator that sells at the same standard sheet price as the old radiator types—if you want a radiator approved by Architects, Engineers and Heating Contractors alike—you want a *genuine* AERO RADIATOR; not an Aero type radiator.

Literature mailed free upon request.

NATIONAL RADIATOR COMPANY
JOHNSTOWN, PA.
New York Philadelphia Baltimore Washington Richmond Pittsburgh
Cincinnati Cleveland Chicago



At top:—Apartment, 1130 Lake Shore Drive, Chicago, Illinois.

At lower left:—Cornelia Apartment Hotel, Chicago.

Robert DeGoyer, Architect.

H. L. Clute & Co., Mechanical Engineers.

Davis Construction Company, Heating Contractors.

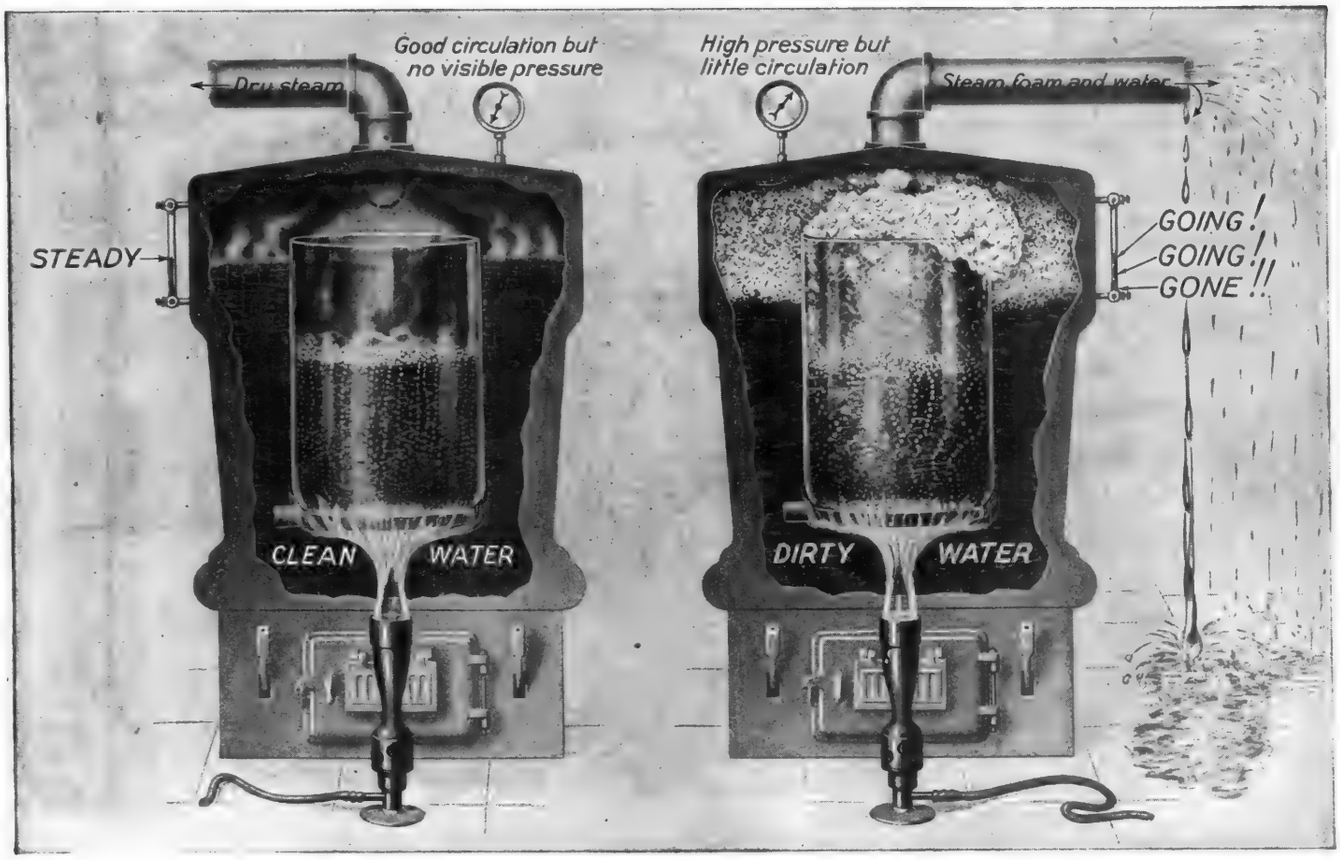
The beautiful, graceful, slender and pleasingly proportioned Aero Radiator is used throughout on both of these buildings.

Above is shown the newest unit—4 column pattern—of the first and only complete line of new style radiators, which were introduced more than four years ago. Like the rest of the complete Line of Aero Radiators, this pattern is top and bottom push-nipple connected, which makes it not only leak proof but suitable to any method of heating, whether it be a steam, vapor or hot water job. Four patterns and eighteen heights comprise the Aero Line, from which you can pick a pattern and height to exactly suit your requirements.

BEAUTY *and* WARMTH *with*

AERO RADIATORS

Look at your heating troubles through these glasses!



BOIL a pan of clean water and a pan of milk. The water boils evenly and stays in the pan, but the milk foams up and runs over one side.

Make the same experiment with chocolate, dirty soapy water, etc. The greater the oily or dirty content, the more violent the boiling eruptions and the more and quicker the froth goes up and out.

Exactly the same thing happens in a Steam Heating Boiler

EVERY new or remodeled system contains the oil and grease that was originally smeared on finished surfaces and threads to prevent rust, and more that was added in thread cutting and in assembling pipe joints. In addition there is the accumulation of dirt inside the boiler and radiator castings, scale in the pipes, etc.

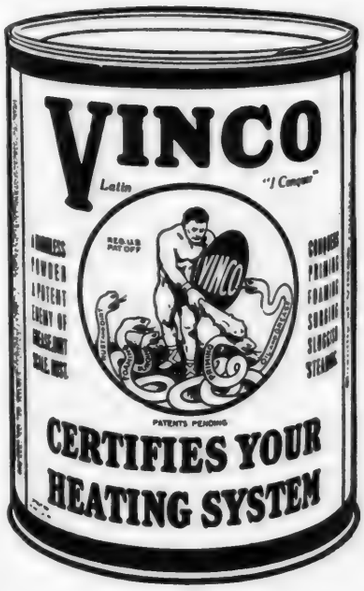
Impurities not already in the boiler are carried there by the circulation. Those that form deposits insulate the heating surface and send to the chimney heat that should go into the water. Those that float form a thick oil blanket, through which steam can disengage only after violent eruptions, resulting in bumping and surging. Those that stay in the water increase the tendency to foaming and priming. Instead of dry steam the boiler sends foam and solid water far up into the steam space and out into the mains.

Water slugs then choke the steam flow and call for higher boiler pressure, which only drives the water farther into the system. Some lines may choke completely, and even in those which do not, the water plus the excessive condensation causes banging of pipes, spitting at air valves and deadening of important radiating surfaces.

Worst of all, the water taken and kept out of the boiler exposes crown surfaces to overheating. Then when water from the mains does come back, the sudden inrush of cooled slugs causes strain and cracking of boiler sections. This is the largest cause of boiler breakdowns.

All these conditions exist more or less in every new or remodeled heating system; as well as in old systems that were never thoroughly cleaned. They cannot be corrected without a thorough internal cleansing.

When you make the final acceptance test of a steam or vapor heating system —MAKE IT FINAL—use VINCO



YOU can't afford avoidable return calls and wasted steam-fitter hours during the busy season. You should be *through* with a well engineered and erected job *on delivery. You will be* if you use Vinco to start the system with a clean bill of health and to maintain free easy steaming for the rest of the season.

At the insignificant average cost of less than one cent per square foot of radiation, Vinco stops foaming, surging and priming completely and quickly develops the best performance permitted by the design of a new or remodeled system.

How Vinco does its work

VINCO is neither acid nor alkaline. It is not a solution of soap nor an emulsion of oil. It contains no volatile substances. It is simply and solely an insoluble non-volatile absorbent. It stays in the boiler where it belongs.

Yet it Cleans the Entire System because its application is based on a simple truth that every steamfitter knows—DRY STEAM EMULSIFIES OIL: if you can send dry steam up into your heating system it will loosen the oil that holds together the rust, scale and dirt up there, and bring them back to the boiler.

That's just what Vinco does. It cleans the boiler quickly—stops priming and foaming so that dry steam gets up into the system.

Vinco is an insoluble powder with the power to absorb, attract, and hold the oil, rust and dirt in the boiler water. Every minute particle of this powder absorbs many times its own weight of boiler impurities. It then becomes heavier than water, settles when the fire is banked at night, and is removed by drawing off sufficient water, as provided by our directions. The unused Vinco remains in suspension in the boiler water. A few hours, often only a few minutes after Vinco is applied, the foaming in the boiler is checked and dry steam is delivered to piping and radiators. This soon carries the oil back into the boiler—rust and dirt having lost the oil binder cannot adhere. Within six days of normal operation, all these impurities are back in the boiler to be speedily disposed of by Vinco. The entire system is then scrupulously clean—Vinco Clean.

After the initial cleansing, a small amount of Vinco put into the boiler at the beginning of each heating season *and left there* will keep all internal surfaces constantly free from deposits.

Quantity of Vinco Required

For systems having	
Up to 350 sq. ft. of radiation	3 lb.
351 to 600 sq. ft. of radiation	5 lb.
601 to 1100 sq. ft. of radiation	8 lb.
1101 to 1400 sq. ft. of radiation	10 lb.
1401 to 1800 sq. ft. of radiation	13 lb.
1801 to 2100 sq. ft. of radiation	15 lb.
2101 to 2700 sq. ft. of radiation	18 lb.
2701 to 3100 sq. ft. of radiation	20 lb.
3101 to 3700 sq. ft. of radiation	23 lb.
3701 to 4200 sq. ft. of radiation	26 lb.
4201 to 4600 sq. ft. of radiation	28 lb.
4601 to 5000 sq. ft. of radiation	30 lb.

Above 5000 sq. ft. use an additional pound of Vinco for each additional 300 sq. ft. of radiation.

In determining amount of Vinco to be used all radiation may be taken at actual rating.

The above quantities are for new or remodeled systems. After the initial season, half the quantity put into the boiler at the beginning of each succeeding season *and left there* will keep all internal surfaces constantly free from deposits.

Good Results guaranteed on a money-back basis

WE guarantee that Vinco used in accordance with the accompanying quantity table and the directions on each package will fully meet every performance claim—that its use for the purpose intended will assure complete heating satisfaction to the owner, and prompt willing acceptance to the contractor. Unless the results are entirely as represented, the purchase price will be refunded. All Vinco dealers are authorized to make such refund on receipt of signed request and statement of facts.

Accept Only Genuine Vinco

VINCO is never sold in bulk or under other name. Patents are pending upon the product and method of application. The use of any unlawful imitation will be subject to prosecution.

For safety and full benefits, specify by name and see that the material comes from 3-lb., 5-lb. or 10-lb. lithographed cans bearing our name and registered trade mark as shown.

If your wholesaler is out of stock, write directly to us and we will see that you are supplied.

The Vinco Company, Inc., 75 Vesey St., New York.

Please advise where Vinco may be obtained and at what cost to clean out a heating system with .....sq. ft. of radiation.

Name .....

Address .....

Name of Jobber.....

"I conquer" (*Latin*)

VINCO

conquers **foaming, surging, priming**

by removing **oil, grease, rust, scale and dirt**

We Selected ABC after testing oil burners for five months

THE BAIRD MACHINE CO.

Chas. L. Warner

Pres. & Treas.

Read how a New distributor selected ABC

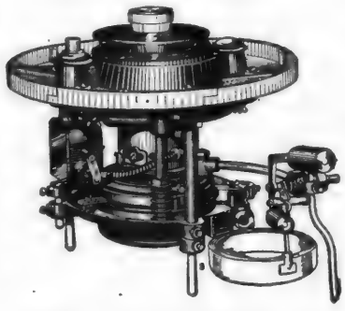
"Selecting an oil burner is a process of elimination," said Mr. Warner, President of The Baird Machine Company of Bridgeport, Conn., a half million dollar concern.

"ABC was the last burner we had to test, if it had not passed we would have given up. ..... We studied atomization first and found ABC the best. We studied fire application to the boiler and found it the best. We went all through each item in this way during these past months."

"Lastly we took price into consideration. We found ABC equal in price to other high class burners, but we felt still there was an advantage here. Your burner is so simple we believe that when real competition comes and you have acquired a real production, you can compete with, or even beat, the price of all other good burners."

The Baird Machine Company are engineers. They are manufacturers of automatic machinery. They also manufacture, sell and install steam, water, vapor and hot air heaters. So they know heating. No individual, and few organizations, are as excellently equipped to test and select a burner as Baird. You can confidently follow their lead.

ARE YOU INTERESTED in an ABC agency? Write us for full details. No obligation. Gladly we will tell you how to make money selling ABC—the burner that is bought when efficiency is sought.



"Has a real service heart with one moving part"

Passed by New York Board of Standards and Appeals.

Approved by Underwriters' Laboratories.

AUTOMATIC BURNER CORPORATION

312 N. May Street, Chicago

ABC OIL BURNER

no noise ~ no carbon

Three Convincing Reasons why a *Petro* franchise is a perfect business *investment*

Read how this perfected oil burner gives a consistent, fast-growing profit to every dealer who sells it

THREE important points decide the profits of an oil burner franchise. First, the burner itself. Second, the profit per sale. And third, the cooperation and selling effort that the manufacturer puts behind the burner. Below are the plain facts about the Petro. Read exactly how this burner satisfies these three important requirements.

1. ***The burner itself.*** The first consideration is the burner itself. Much of your business will be built on word-of-mouth advertising. One satisfied owner tells another. And of course frequent servicing quickly eats up profits.

Mechanically, the Petro residence oil burner is unsurpassed. Actual experience of hundreds of home owners has proved this. The Petro was designed by a group of nationally known engineers. These engineers spared neither effort nor expense to build an oil burner so perfect as to defy comparison. And they succeeded.

The Petro is quiet. It is entirely automatic. It is completely fool proof. Every part is constructed of the finest materials. The four moving parts work in a whisper. The Petro is listed as standard by the Underwriters Laboratories.

The hundreds of Petro burners now installed have set new standards for freedom from servicing. In the company files in New York are scores of letters from enthusiastic Petro owners. Dealers who sell the Petro find that every Petro installation means another Petro salesman.

2. ***Your profit per sale.*** The Petro retails for $975. This retail price includes a handsome dealer profit. The Petroleum Heat and Power Company believes that profits should be divided on a fair basis. It has been our experience that the larger the dealer profit, the bigger the company volume, and the better for everyone concerned.

3. ***The company that makes the Petro.*** The Petroleum Heat and Power Company, makers of the Petro, have been in the oil burner business since 1903. Today Petroleum Heat and Power Company burners heat the Ritz-Carlton hotel in New York, the Mark Hopkins in San Francisco, John Wanamaker stores, Harvard University, Metropolitan Tower and thousands of other well known buildings.

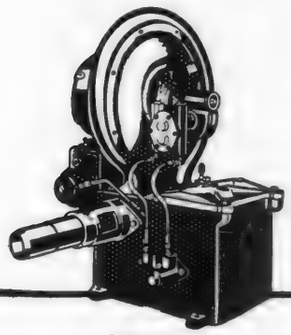
The Petroleum Heat and Power Company is amply financed. It is directed by men who know oil burners and the oil burner market. The Petroleum Heat and Power Company believes in the closest dealer cooperation. All dealers are provided with direct mail literature—literature that makes sales. Dealers are given an advertising allowance for use in their local newspapers.

Send for more information

No oil burner is any more successful than the men who install and sell it. That is why we are out to get the best oil burner man in every town and city in the country. That is why we have set unusually high standards. But you may be exactly the man we want—even if your oil burner experience is limited.

Clip the coupon below. Send it in. We will send you detailed information and a questionnaire to fill out. Get busy today. We have burners ready to ship now.

This is the Petro—the perfected residence oil burner. Hundreds of these burners have already proved their reliability in actual use.



PETRO

RESIDENCE OIL BURNER

A product of

PETROLEUM HEAT AND POWER COMPANY

Main Office: 511 Fifth Avenue, New York

Petroleum Heat and Power Company
511 Fifth Avenue
New York City

Gentlemen:

I am interested in becoming a dealer for the Petro Residence Oil Burner. Please send me an application blank and further information.

Name.....

Street.....

City.....State.....

Low Power Input

THE Webster Ignition Transformer produces a spark of unusal size and length at normal voltage with an exceptionally low power input! This is an outstanding feature of this efficient ignition unit and a factor which merits the serious consideration of oil burner manufacturers • • The economy, efficiency and unfailing dependability of the Webster Ignition Transformer is being proved daily in both tests and actual use • • The Webster Sales and Engineering Departments are ready to prove this to you.

The Webster Ignition Transformer can be furnished with either single or double high tension terminals, 110 or 220 volts, 60 cycle, and 110 or 220 volts, 25 cycle.

WEBSTER ELECTRIC COMPANY, *Racine, Wisconsin*
"Specialists in Oil Burner Ignition"

Webster Ignition Transformer

PROFIT

more by selling the *Sundstrand* Oil Heat Generator

because the SERVICE cost is *less*

THE Sundstrand Oil Heat Generator keeps customers satisfied and doesn't eat up your profits in costly "Trouble" calls.

Investigate this burner and the sales and installation plan behind it which marks a new and unusual advancement made in automatic home heating with oil. All excessive parts and trouble-inviting complications have been eliminated.

It has taken three years to whip the service problems which developed after the Sundstrand was perfected to the point where it was ready to place on the market. But those three years of experience have resulted in a compact unit of "built-in" parts with a heavy cast and machined base. Motor, blower fan, four cylinder compression air pump, spiral gear oil pump, etc., all DIRECTLY connected by an extra heavy drive shaft of tool steel.

When you sell the Sundstrand, following our practical, profitable sales and installation methods, you are sure of permanently satisfied customers and freedom from profit-eating service problems.

Quiet combustion, economy and safety result from the Sundstrand's complete control of air, oil and flame combined with full-automatic safety controls. You will be interested in our sales plan, dealer aids and profit-insuring installation system. Write or wire for details.

SUNDSTRAND

"Progressive" Combustion Assures QUIET

and complete burning of inexpensive oil and an efficient heating flame. The Sundstrand Giant Arc Ignition, which has no working parts, provides positive, never-failing ignition and guarantees there is no radio interference.

We Teach You How to Make Profitable Installations

Dealers who qualify for Sundstrand Franchises are taught how to make sure of satisfactory, profitable installations, by avoiding or eliminating trouble caused by faulty heating plants.

SUNDSTRAND ENGINEERING CO., Rockford, Ill., U. S. A.

Pop Decides Not to Fire the Sweeper

"Here, Lad—

fire that sweeper in the lower plant—he's too careless! Last night he ran his rubbish truck against a motor and broke a foot off it—so we lose that machine's production until they get a new motor on the job."

"No, Pop—

you can't buy common sense in a sweeper, but you'd at least *expect* it in a motor maker.

There's always something sideswiping motors—and yet your gang of stiff-back motor assemblers stick to cast-iron feet. If they themselves didn't have clay feet they would weld drop-forged feet to a steel frame—just as in the Linc-Weld Motor.

Then your sweeper could do calisthenics with a sixteen-pound sledge and he couldn't 'drop' a motor."

See Page 7 of the Motor Book.
Better get yourself a copy from Dept. 16-12.

The Lincoln Electric Company, Cleveland, Ohio

MA 2

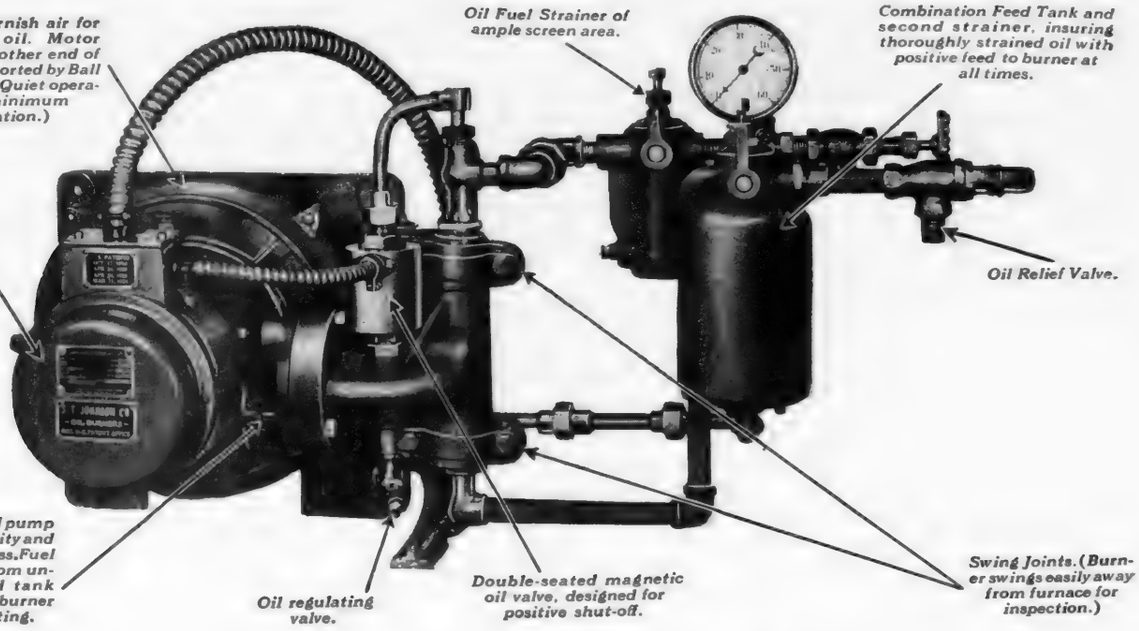
"Linc-Weld"

LINCOLN MOTOR

DURABLE!

Year-in and year-out service is taken for granted by the thousands of owners of Johnson Oil Burners. ¶The amazing *durability* of the Johnson is a result of scientific design based on 21 years' experience. ¶*Durability* is achieved through simplicity, compactness and the use of highest grade materials. Johnson Rotary Oil Burners *last!*

JOHNSON OIL BURNERS©


Fan to furnish air for atomized oil. Motor rotor is at other end of shaft, supported by Ball Bearings. (Quiet operation - minimum vibration.)
Oil Fuel Strainer of ample screen area.
Combination Feed Tank and second strainer, insuring thoroughly strained oil with positive feed to burner at all times.
Totally enclosed air-cooled motor.
Oil Relief Valve.
Built-in oil pump for simplicity and compactness. Fuel pumped from underground tank only when burner is operating.
Oil regulating valve.
Double-seated magnetic oil valve, designed for positive shut-off.
Swing Joints. (Burner swings easily away from furnace for inspection.)

Main Office and Factory
940-950 Arlington Avenue
OAKLAND, CALIF.

S. T. JOHNSON CO.
OIL BURNERS
TRADE MARK REGISTERED

Factory Branch Offices
San Francisco, Sacramento
Philadelphia

DISTRIBUTORS AND DEALERS THROUGHOUT THE UNITED STATES AND IN FOREIGN COUNTRIES

The Johnson Rotary Burner with Full Automatic Control is listed as standard by Underwriters' Laboratories, an organization established and maintained by the National Board of Fire Underwriters.

Opportunity for Dealers

The recent addition of full automatic control to the famous Johnson Rotary has greatly enlarged the sales opportunities for Johnson Dealers.

Some desirable territory is still available for a few reliable distributors. Write or wire for full details and new illustrated booklets.

48-1026

Date_____

S. T. JOHNSON CO.,
940-950 Arlington Avenue, Oakland, Calif.

Please mail booklet describing the Johnson Automatic Rotary Burner and explain dealer proposition.

Name_____

Address_____

RAYFIELD

PATENTS PENDING

Automatic Fuel Oil Burners

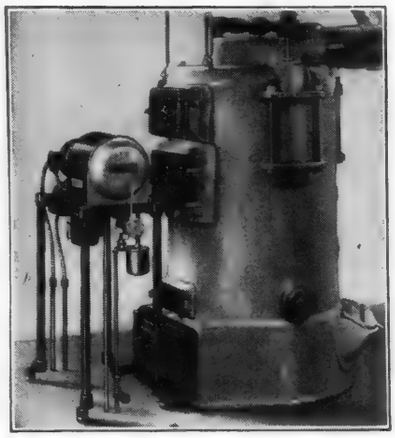
Note These Important Features

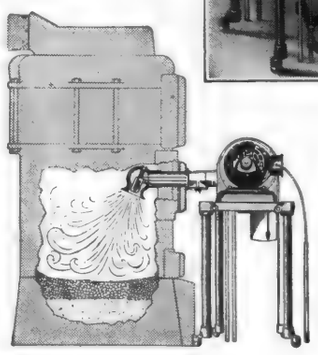
1. Utilizes the Radiant Heat Principle.
2. Positive Electric Ignition.
3. Air-cooled, Non-carbonizing Nozzle.
4. Triple Atomization.
5. Double-Length Flame Travel.
6. No Baffling Walls.
7. Really Quiet (not maybe).
8. Rayfield Flame Safety.
9. Latest Minneapolis Controls.
10. Complete Line—5 sizes.
11. Burns Fuel Oil—28/30 For Homes: Lower Gravities for Factories.

Rayfield's Scientific Combustion

Note the illustration. The nozzle is suspended over the fire pot. The vapor, burning in suspension, is forced directly downward to the crushed fire brick at the bottom, then deflected to the sides and rises evenly along the walls of the fire box before the generated heat escapes through the flue. In this manner the flame travels twice the usual distance in the fire box, giving off the maximum heat at the bottom of the fire box and completing combustion before reaching the flue.

The Radiant Heat principle is utilized through the bed of crushed fire brick placed in the ash pit. In operation this brick quickly becomes incandescent, absorbing and holding the heat that would otherwise be lost up the chimney. Long after the burner has been shut off by the thermostat, this white-hot bed of crushed brick continues to radiate its stored heat and thus assists in maintaining an even temperature throughout the building.





The Rayfield is a Super-system of heating designed and developed by Chas. L. Rayfield, inventor of the well-known Rayfield Carburetor for automobiles, and an acknowledged authority on the combustion of liquid fuels.

Built by Engineers—Approved by Men Who Know the Heating Business

Heating plant engineers, manufacturers and oil-burner men quickly approve the Rayfield after inspection and testing.

These men came to see what we have. Some of them were open-minded, some were not. They witnessed demonstrations, inspected burners in operation, talked to users and made tests under their own conditions.

As a result of their observations they report that the Rayfield is:

—a simple and quiet power burner

—correct from an engineering standpoint

—equipped with remarkable safety controls.

You are invited to make a similar investigation of the Rayfield, and you should do it if you are following the trend of the heating trade toward oil burning.

For Steam, Vapor, Hot Water, Hot Air

The Rayfield is fully automatic and operates successfully in any good heating plant. It comes in various sizes and has had three years of practical tests in homes, apartments, theatres and factories.

You have been waiting a long time for this scientific oil burner—a burner that you would readily install in your own home after seeing a demonstration.

Send for illustrated circular.

Rayfield Mfg. Co.

21st and Rockwell Sts. CHICAGO

Listed as Standard by the Underwriters' Laboratories

Contractor-Dealers Wanted

The Rayfield franchise will appeal to men who know the heating business. A profitable connection is offered responsible parties who are prepared to demonstrate, sell and install our equipment. Write for territory and further particulars.

Quiet—Reliable
Built for a Lifetime

Aetna
TRADE-MARK
AUTOMATIC OIL BURNERS

"Which Burner Shall I Sell?"

THIS question has no doubt kept many a good prospective dealer from sharing the profits being derived from the oil burning industry. This question remains unanswered through inability to place confidence in some particular burner or in the company behind it.

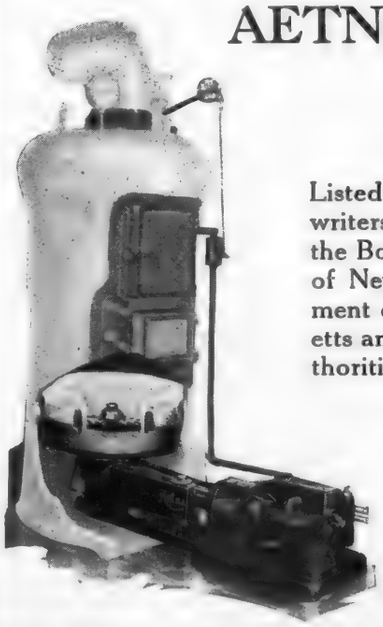
Do you know that the Aetna has to its credit ten years' development and distribution of a fully Automatic Oil Burner? And does this not speak for the soundness of the company behind it?

In handling the Aetna you can take every size and type of installation offered in the whole range of domestic, semi-domestic and industrial service. It is manufactured in nine different sizes and operates on any grade of fuel oil from 28° to 45° A. P. I.

If you are considering the oil burning field as a business or new department, let us send complete data and show how you can advance your local prestige and annual income. Just send us the coupon below.

AETNA AUTOMATIC OIL BURNER, INC.

239 Georgia Avenue **Providence, R. I.**



Listed as approved by the Underwriters' Laboratories, Chicago, by the Board of Standards and Appeals of New York City, by the Department of Public Safety of Massachusetts and insurance and municipal authorities wherever installed.

SAFETY—COMFORT—SATISFACTION

Made on Honor and Fully Guaranteed

AETNA AUTOMATIC
OIL BURNER, INC.
Georgia Ave., Providence, R.I.

Gentlemen:

Please send me full particulars regarding the AETNA Dealers' Plan.

Name .....

Street .....

City..... State.....

H & V4

This dealer *investigated*– *his deliberate choice was the Quiet May*

THERMAL ENGINEERING COMPANY
ROSELLE NEW JERSEY

AUTOMATIC REFRIGERATOR ELECTRIC

WESTFIELD OFFICE 44 ELM ST

ROSELLE OFFICE 121 MONROE ST

Consulting Service in Heat and Refrigeration

SEPTEMBER ELEVEN

May Oil Burner Corporation
Baltimore

ATTENTION: Mr. Canfield

Dear Mr. Canfield:

Yesterday a salesman for another make of burner asked me why I was selling the May. Would it interest you to know my answer? Well, here it is:

First of all, because I'm making money. I'm making money because the burner itself is right. It's true the May company gives good assistance in advertising, have some real sales helps and a worth while engineering department, and are willing to co-operate, so that I find sales are easy.

Easy sales however, even many of them, do not necessarily mean cash for the dealer, as many of know to our sorrow. The terrific service expence some burners demand cuts out the dealer's profit, and gives him UNSATISFIED CUSTOMERS, which is about the worst thing I can think of in this business.

The simple QUIET MAY however, is actually automatic in fact as well as in advertisement. I mean that it works without constant attention. It's so quiet it does not attract attention thru it's noise; the house is always warm, so it does not attract attention when it starts to warm up; it's odorless, so it does not attract attention thru the sence of smell; it's clean, so it does not attract attention to soot and dust; it's reliable, so it does not attract the attention of the dealer; and it's efficient, so it attracts only passing attention on the first of the month when the oil bills come in.

Those are about the words and the way in which I told why I'm selling the MAY, and as we have investigated in the neighborhood of a thousand burners,---gravity, natural draft, forced draft, pump, vaporizers, centrifugal atomizers, air atomizers, pressure atomizers, in various combination and true types, we are happy in our selection.

Best wishes,

Earl R. Snavely.

Earl R.Snavely, President,
Thermal Engineering Company.

We did not ask Mr. Snavely to write the letter reprinted in this advertisement, nor did we instruct him what to say. In his own words, and out of his own experience, he has drawn a more convincing picture of the Quiet May's superiority than any artificially stimulated testimonial could have done.

Our dealer finance and consumer deferred - payment plans have induced many experienced oil burner dealers to turn to the Quiet May. Our expert factory co-operation with dealers has helped them greatly in selling the Quiet May; and our advertising is outstanding. But the real reason for the success of Quiet May dealers is due to the Quiet May itself, as this letter convincingly shows.

Desirable franchises are still available for dealers. Get in touch with us today for complete information. Address MAY OIL BURNER CORPORATION, *Dept. 100. Factory and Main Offices, Baltimore, Md. Branch Offices, 331 Madison Ave., New York; 1020 Commonwealth Ave., Boston; 2401 Chestnut St., Philadelphia; 507 Security Bldg., St. Louis.*

Quiet May AUTOMATIC OIL BURNER

9 constructional features of the EFFICIENT HEATING BOILER

WATER TUBES made of seamless steel tubing. The metal is only ⅛ inch thick. The most rapid transfer of heat from the hot gases around the tubes to the water within the tubes is thus accomplished. A striking contrast to the thick cast iron sections found in most boilers.

THE TUBES ARE NUMEROUS as well as small which brings a large heating surface in contrast with a small volume of water. Quick steaming—less time and the result is less fuel used.

THE TUBES ARE SLOPED at an angle of 10 degrees, giving positive and rapid circulation of the water from the back to the front of the boiler and preventing the tubes from becoming steam bound.

TWO BAFFLES causing the hot gases to pass three times over the tubes, instead of only once. This removes the largest amount of heat from the gases before entering the chimney. The temperature of the gases entering the chimney is seldom more than 235°, which is only about 20° above the temperature of the steam in the boiler.

STEEL HEADERS, into which the tubes are expanded by rolling out their ends, have removable cover plates which makes cleaning of the inside of the tubes easy and positive.

STEAM DRUM, made of steel boiler plate with welded joints, gives ample storage space for steam and water.

BRICK SETTING, or specially designed sheet iron setting which minimizes the loss of heat thru its walls. The sheet iron setting is built in sections that are easily bolted together, can be set up in a very short time. Each section is made up of layers of sheet iron with a half inch space between them. This space is filled with a half inch layer of asbestos to prevent heat from escaping.

THREE CLEANING DOORS in the side of the setting. The outside of the tubes can be reached thru these doors. Any soot that may collect on the tubes can be removed with a long handled wire brush.

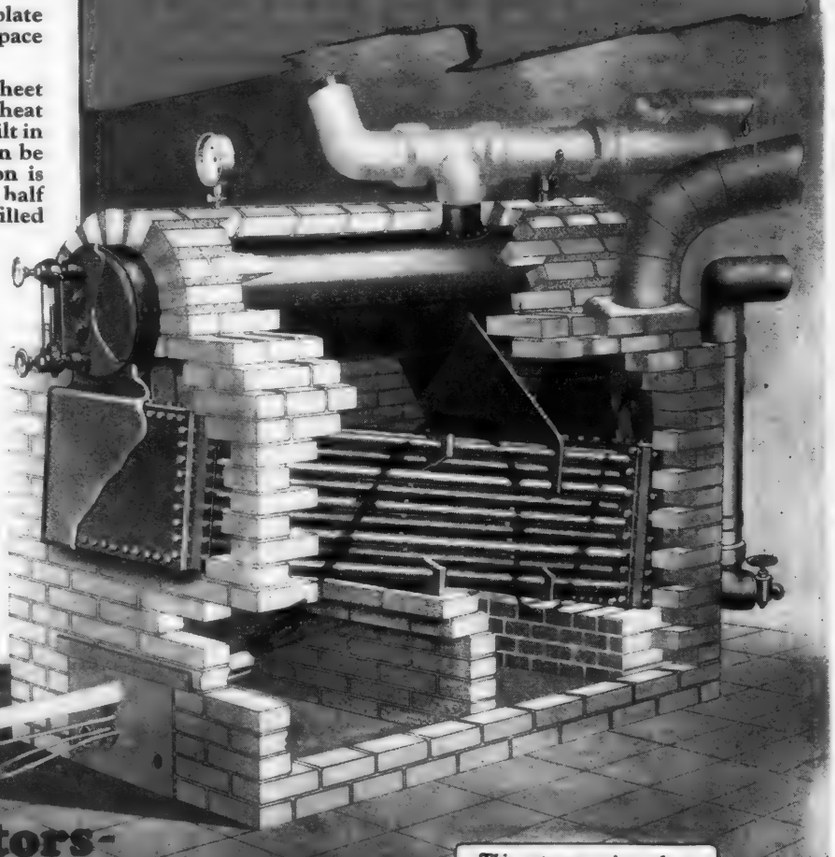
THE BOILER IS SMALL and light in weight in spite of its large heating capacity. Any "Efficient Heating Boiler" can be carried thru the ordinary two-foot-six doorway.

Efficient Heating Boiler Company
4116 So. Halsted St., Chicago, U.S.A.

the EFFICIENT HEATING BOILER

is a specially ★ designed water tube boiler for the oil heating of homes, small apartments, hotels, hospitals, clubs, etc.

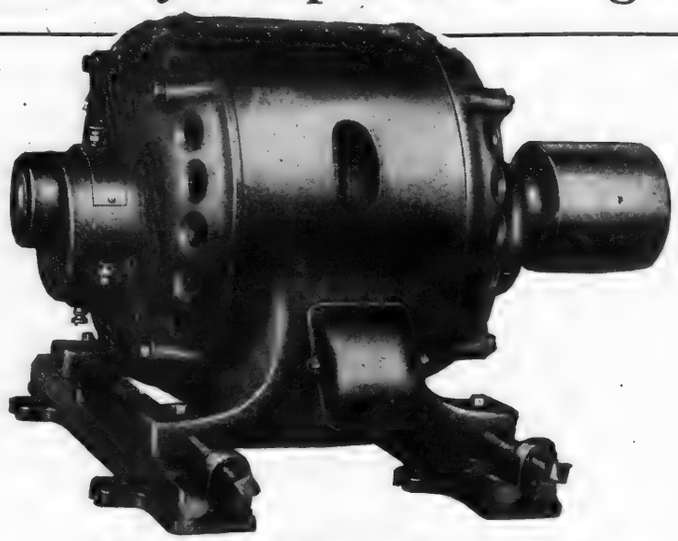
★The efficiency of this boiler will increase the over all efficiency of any oil burner—result is greater economy.



This cut-away view shows how the hot gases are directed by the baffle plates to completely surround and heat the water tubes.

Dealers-Distributors-Heating Contractors-
write for special sales plan, prices and literature.

"They Keep a-Running"



3 Horse Power Century Squirrel-cage Induction Polyphase Motor

Smooth, Quiet Operation

The quiet operation of Century Squirrel-cage Induction Polyphase Motors is the result of over-all efficient design, generous proportioning of electrical materials and careful balancing. These features, combined with their "Keep a-Running" ability, are of particular value in such applications as driving heating and ventilating fans. Other characteristics of these motors are:—

1. Armatures are practically indestructible. Copper conductor bars are brazed to channel-section end rings over an area equal to about six times the cross sectional area of the bars.
2. The bearings last. They are made of cast phosphor bronze (the highest grade bearing material obtainable) with figure-8 oil grooves, assuring positive lubrication. All surfaces are accurately machined to size.
3. Tight-fitting brass dust cap and dust collars make Century motor bearing housings as nearly dust-tight as it is possible to build them. They remain so throughout the life of the motor.

Note: The Century Wool-yarn System of Lubrication—**in which only continuous unbroken strands of pure wool yarn are used**—is standard equipment on all motors of one horse power and smaller sizes. This system assures at least one year's continuous 24-hour-per-day operation without reoiling.

Century Squirrel-cage Induction Polyphase Motors are built in all standard sizes from ¼ to 50 horse power. Temperature rise not more than 40° Centigrade.

CENTURY ELECTRIC COMPANY

1806 Pine St. **St. Louis, Mo.**

For More Than 23 Years at St. Louis

¼ to 50 H.P. **Century MOTORS** ¼ to 50 H.P.

Guaranteed For Ten Years

Note these Features:

- **The Hardinge is listed as standard by the Underwriters' Laboratories and approved by the Board of Standards and Appeals of New York.**
- **It burns all fuel oils—is economical to operate.**
- **Most of the working parts are submerged in oil, making it practically noiseless.**
- **The Hardinge is equipped with automatic gas ignition—the dependable ignition for fuel oil.**
- **It mechanically atomizes the fuel, and introduces oxygen for combustion, without the aid of a blower.**
- **The Hardinge distributes the heat uniformly in the fire box of the boiler in a manner similar to that of a coal-fired boiler. Maximum, steady, even, efficient heat is assured.**

OUR ten year guarantee on every Hardinge is your definite assurance that it will faithfully perform to your customer's utmost satisfaction.

The Hardinge is built of finest materials by a company with more than a third of a century manufacturing experience. Sturdy construction cuts the servicing average to a minimum.

The range of Hardinge sizes—from bungalow to skyscraper—opens up unequalled sales possibilities. Dealers are not required to order any definite number of burners—they are shipped only as required.

The Hardinge franchise in your territory will be profitable both to your customers and yourself. Write—today—for full particulars of our liberal profit-making proposition.

Hardinge Brothers, Inc.

4149 Ravenswood Avenue, Chicago

HARDINGE

FUEL OIL BURNER

RANGE *of* SIZES

Increases Nu-way's Sales Possibilities

Nu-way Burners are made in four sizes—a greater range than has any other burner of its type. This range enables you to sell the owner of a five-room bungalow without asking him to pay for more capacity than he needs. It enables you to sell the owner of a fifty-flat building without over-taxing the burner.

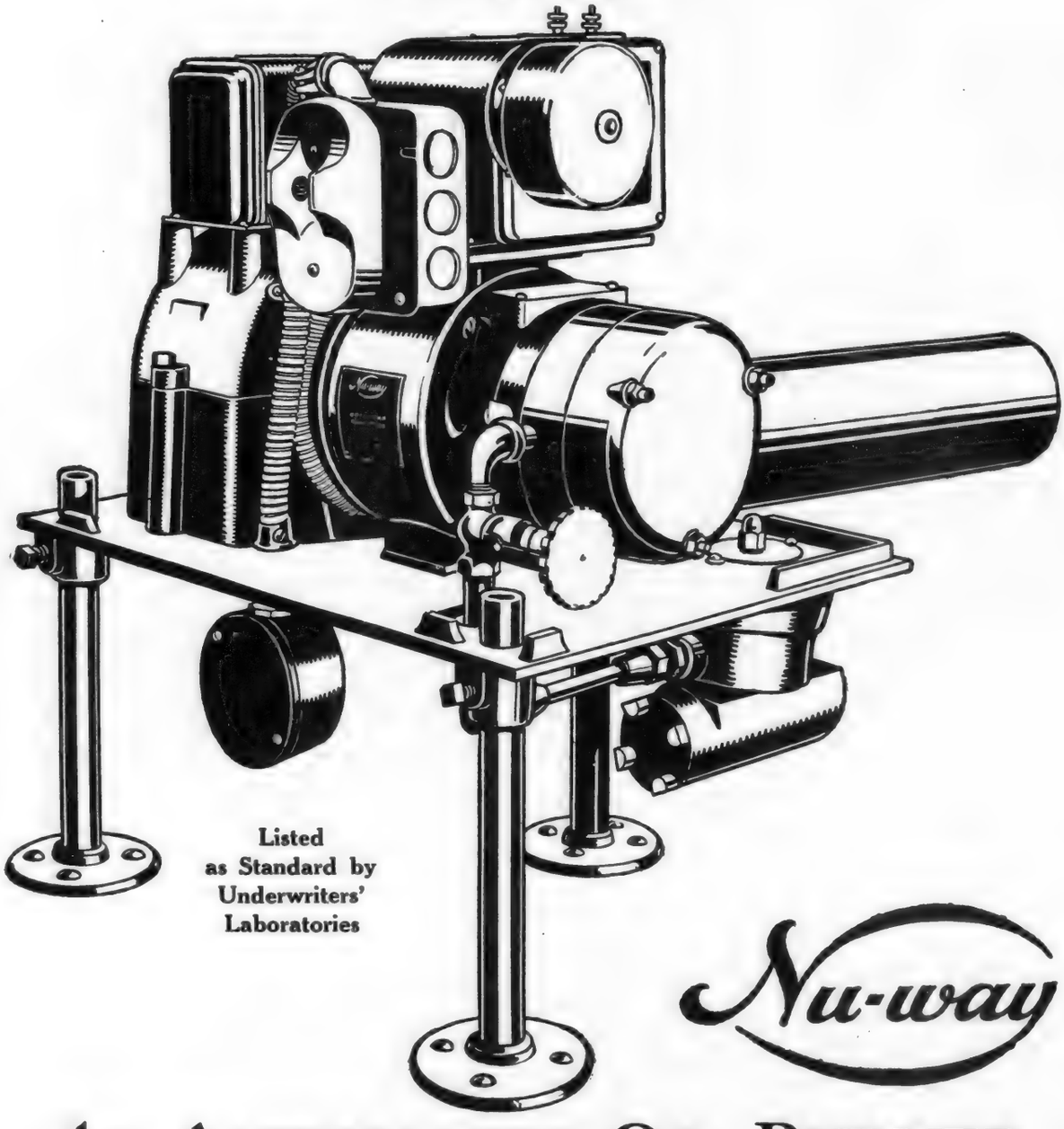
Simplicity and Other Sales Features

To range of sizes add the advantages of simplicity, of lack of vibration, with attendant long life. Nu-way is listed as standard to burn 28 gravity fuel oil up to 48 gravity distillate. It has a timed ignition system that prevents delayed ignition and backfire. Its special parts are made by world-famous firms. Has special protective devices that work automatically.

Write for Plan

The Nu-way and our selling plan is appealing to reliable dealers everywhere. Write for our prices, literature and ideal financing plan. Is your territory open? Write and see. It will pay you.

THE NU-WAY CORPORATION
ROCK ISLAND, ILLINOIS



Listed as Standard by Underwriters' Laboratories

Nu-way

An AUTOMATIC OIL BURNER

1. Connection into lower gauge glass tapping.
2. Connection into upper gauge glass tapping.
3. Main line current.

The
McDONNELL & MILLER
Duplex Switch
Low Water and Pressure

Is Easy to Install

THERE'S no tapping of the boiler, no complicated piping and no possibility of incorrect installation. An hour does the job. And when you have installed a McDonnell & Miller Duplex Switch on the boiler you *know* that, if someone forgets the water line, the burner will be cut off when the water reaches the bottom of the gauge glass.

You also know that when you set it to cut out and in at any two points between 2 oz. and 10 lbs. that you can go back at any time after and find it controlling the burner at the *same two pressures.*

Easy installation has made a lot of friends for the Duplex Switch and it holds its friends because it's absolutely dependable.

One trial will convince you. Order one today.

McDonnell & Miller

General Offices • WRIGLEY BUILDING • CHICAGO

The Master Furnace Man

"Blood of Oil
Muscles of Steel,
Nerves of Wire"

A Sales Giant
always at work for you!

The Master Furnace Man is a master salesman, commanding the attention of home owners everywhere to Electrol advantages.

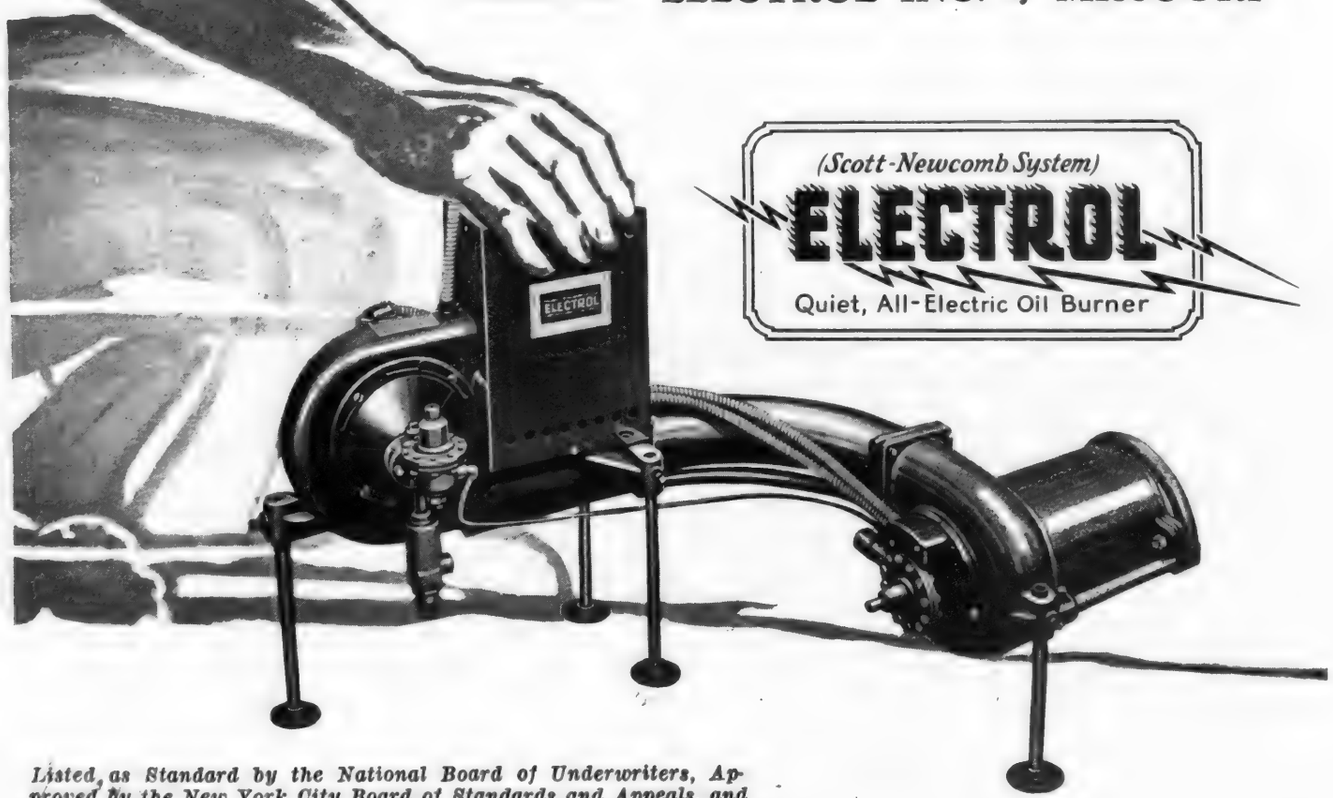
He stands for dependable oil heat—master workmanship—master design—the famous *Master Control* of the Electrol quiet, all-electric, all-automatic oil burner.

Four million colorful Electrol advertisements per issue in *The Saturday Evening Post* and *Literary Digest* carry his message to today's and tomorrow's buyers of oil burners.

Write for details of the Electrol Exclusive Sales Proposition. Your territory may be open.

Made in St. Louis by

ELECTROL INC. *of* MISSOURI

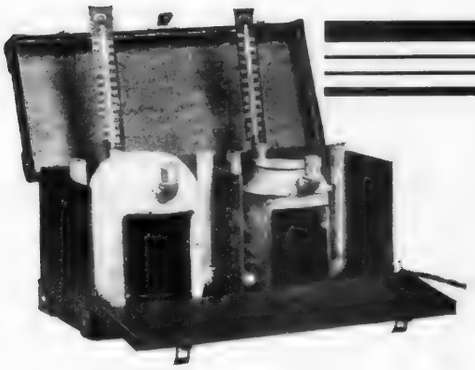


(Scott-Newcomb System)

ELECTROL

Quiet, All-Electric Oil Burner

Listed as Standard by the National Board of Underwriters, Approved by the New York City Board of Standards and Appeals, and the Commonwealth of Massachusetts, Department of Public Safety.



This Little Demonstrator Makes it Easy to Sell

MINWOOL Furnace Overcoats

The efficiency of any heating plant depends on the proportion of effective heating surface as compared to the waste surface. Reduce or insulate the waste surface and you start saving fuel.

It is so easy for Minwool to start this saving and reduce heat waste that this little portable demonstrator can prove it with the heat from two electric lights.

Two thermometers show the result—which is so obvious that the prospect almost sells himself.

Besides paying for itself The Minwool Furnace Overcoat silences oil burner and combustion noises, reduces fire hazard and improves circulation.

Minwool Furnace Overcoat is a money maker. Only one size kit to stock, easily applied, no service and easy to sell.

Get the Minwool Contract for Your Town

For Steam, Vapor or Hot Water Plants

For Warm Air Furnaces

Better Than Asbestos

Better Than 85% Magnesia

Easy to Apply

Pays For Itself

Makes Buyers Boosters

THE MINWOOL INSULATING COMPANY

606 Ohio Bldg. **TOLEDO, OHIO**

An even better AIRID at a lower cost

Enormous Volume has made this possible

Sales of Airid Air Valves have been increasing steadily and the great volume that has been attained has made possible elaborate improvements and refinements of equipment.

These improvements of equipment have made possible an even better Airid. The great volume in production has brought a reduction in our cost. This reduction in cost we are passing on to you.

How we have improved Airid Air Valves

The features that have made Airids so successful for the last five years are all retained, but improvements have been incorporated in the construction that will make Airids even more popular.

The most outstanding of these improvements is an increase in venting capacity and a method of sealing the shell and the base with an absolutely tight joint—a new development for air valves.

New low price means more sales

The new consumer's price for Airids is $1.35 instead of $1.60. Naturally, this lower price will make more people feel able to buy Airids and now you can use them on every job.

Big national advertising campaign just starting

Millions of advertisements are being carried this Fall in national magazines and newspapers. These advertisements will run in Saturday Evening Post, Literary Digest, Liberty, American Magazine and many others.

Make your shop headquarters for Airids and get your share of the business. You can do this by

1. Having a stock of Airids on hand.
2. Displaying the Airid in your windows.
3. Keeping an Airid display carton on your counter.

Mail the coupon today

AMERICAN RADIATOR COMPANY

Specialties Department

816 So. Michigan Ave. Chicago, Ill.

AMERICAN RADIATOR COMPANY

Specialties Department

816 So. Michigan Ave., Chicago, Ill.

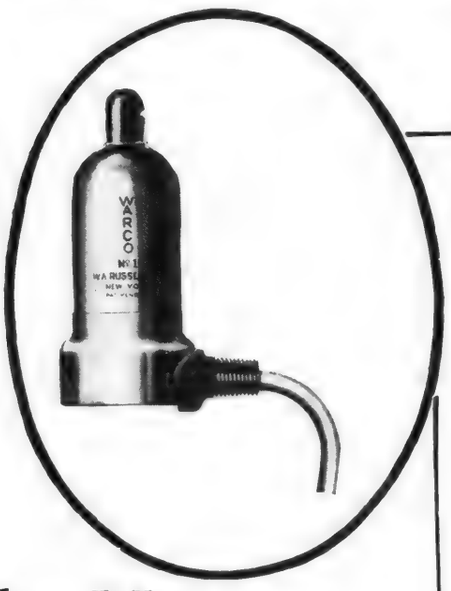
Gentlemen: I have / have not a stock of Airid Air Valves on hand. Please send me one of the new Bronzine signs that will make my shop headquarters for Airids.

Yours very truly,

NAME _____

ADDRESS _____

CITY _____ STATE _____



Seven Reasons Why "Warco" No. 1 *Maintains* Its Efficiency

1. Larger air port than on any other air valve.
2. Float Diaphragm supported at *five* points, instead of one,—assuring positive closing.
3. Positive separation of air and condensate.
4. Nipple wrought from 1/16" hard drawn sheet brass with special fool-proof attachment. Cannot be loosened or twisted off.
5. Cap made from solid brass rod and *will not dent.*
6. Heavily wrought brass base.
7. Outer shell made from extra heavy gauge, hard drawn sheet brass.

Why the New "Warco" No. 1 is the Most Rapid Venting Air Valve on the Market

Having announced and described the complete new line of seven "Warco" Air and Vacuum Valves, we are now going to take up each one of these Valves separately and explain why it is the *best* of its type.

The principal function of an air valve is to expel air from the radiator *quickly*. Its speed in expelling the air determines its efficiency and it is quite evident that the size of its air port determines this speed.

The new "Warco" No. 1 Air Valve has the largest air port of any radiator air valve on the market. It therefore goes without saying that it is the most rapid venting air valve on the market. An actual test on any steam radiator will give first-hand evidence on this point.

But it is not only on *test* that this perfected "Warco" Air Valve will demonstrate its speed in expelling air from a radiator. It will *maintain* its speed and efficiency, day in, day out—winter after winter. Because—like the other valves in the complete new "Warco" Line—this new "Warco" No. 1 was designed and perfected by W. A. Russell, the *inventor* of the volatile liquid air valve principle. It is on the word of Mr. Russell that the "Warco" No. 1 is offered as the best Air Valve on the market and *guaranteed for five full years.*

Just as "Warco" quality means greater customer satisfaction and the elimination of service expense, so do the liberal "Warco" discounts mean greater profit on individual sales.

Write for discounts today and for the name of your nearest "Warco" Wholesaler.

W. A. RUSSELL & COMPANY, Grand Central Terminal Bldg., NEW YORK CITY

Chicago Boston Pittsburgh Los Angeles ∴ Established 1890

"Warco"

TRADE MARK REGISTERED

Automatic Air and Vacuum **Valves**

As Tiny Tim Would Say—

If we could bring to the hearts of men—this coming Christmas time and all the near New Year—Good Cheer and Comfort in the same degree that we do fill with warmth their homes and shops, their mills and offices—how we all would live up to the Specifications laid down in the Blueprint of Life by the Great Architect!

For ourselves, we highly prize the Good Will of each man and organization in our own and allied professions. Remindful of their Good Will in 1926, we take this opportunity to wish them "every one," as Tiny Tim would say—

A Merry Christmas
and
A Prosperous New Year

Barnes & Jones

VAPOR and VACUUM HEATING SYSTEMS of PROVEN QUALITY

5 Melrose Street, Boston *300 Madison Ave., New York City*

Announcing The Dunham Differential Vacuum Heating System

A System of Heating which heats a building with coal—gas—or oil fuel, without the fuel and heat-waste of over-heating in mild weather.

SEVERAL years of intensive research work with analytical operative tests in the company's research laboratories, are back of this announcement of the Dunham Differential Vacuum Heating System. The practicability and fuel-saving efficiency of this new system of heating is further proved by its actual operation in several commercial installations. Performance, not guess work, is therefore the foundation of this announcement.

The Dunham Differential Vacuum Heating System provides a fixed differential that permits circulation of steam at all pressures and temperatures. Circulation is more uniformly distributed than possible heretofore, because the pressure (absolute) in the supply main is always slightly greater than that in the return main.

Outstanding features of this 1926 Dunham Contribution to the science of heating are (1) a much greater fuel economy when firing with coal; (2) a practical and economical use of gas and oil in all types of buildings.

The generation of steam, when starting a cold boiler begins at a much lower temperature than under atmospheric pressure because of the vacuum produced by the pump. The steam expands under the vacuum condition and fills the radiator with the result that substantially the entire radiator surface is working at either a high or low temperature.

In mild weather the differential controller on the vacuum pump maintains the condition in the return mains at a pressure less, or vacuum greater, than in the supply mains. Circulation is therefore maintained irrespective of supply pipe pressure or vacuum. The system fills with steam at pressures below atmosphere and the Dunham Traps on the radiators function to pass all air and water and to close against steam under this wide range of conditions.

In severe weather the pressure can be regulated to supply steam at such a rate that the supply piping and radiators will have a pressure greater than atmosphere.

DUNHAM HEATING SERVICE

THIS Differential System will properly heat any building without the fuel and heat-waste of over-heating in mild weather. It furnishes steam to the radiators at a high degree of vacuum with correspondingly low radiator temperature, without water accumulating in radiators or steam leakage to returns.

This is accomplished by

—regulating the pressure, or vacuum, at which the steam circulates in the supply piping

—controlling the vacuum pump so that a substantially constant difference in pressure is maintained between the supply and return piping.

Pressure, or vacuum, is thus maintained on the steam supply to provide the desired room temperature, by controlling the heat emission from the radiators at the same rate as it is being lost from the building.

IT WILL be recognized that the Dunham Differential Vacuum Heating System achieves a goal of fuel-saving and temperature-comfort long sought in steam heating. We believe that this announcement marks an epoch-making advance over present types of steam heating systems, even the most modern. We shall be glad to send descriptive literature to those interested. A request on your business letterhead will bring it to you.

The Dunham Differential Vacuum Heating System is fully covered by patents and pending applications for patents in the United States, Canada and foreign countries. Any infringements will be vigorously prosecuted.

C. A. DUNHAM CO.

DUNHAM BUILDING

450 East Ohio Street ∿ ∿ ∿ Chicago

A typical Thrush Installation—Compact, Neat and Simple.

Thrush Differential Pressure Relief.

Thrush Automatic Damper Regulator

Thrush installation is Quick and Easy!

JUST six feet of pipe and eight fittings needed for the complete Thrush Tank-in-basement Installation! Think of the time and labor saved! The tank can't freeze, won't waterlog, is out of the way.

Remember—Thrush System speeds up heat transmission, saves fuel, assures circulation, and provides uniform temperatures with very little attention. Ask the man who is using Thrush equipment—he'll tell you it's dependable and *stands the test of years.*

Ask Your Jobber!

Thrush Plan Service

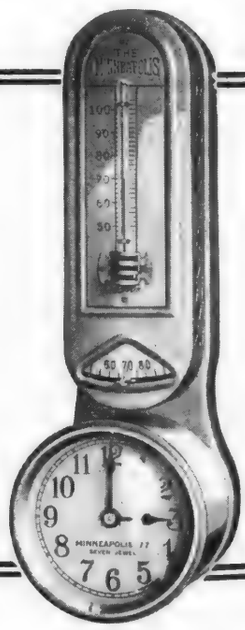
Ask for piping plans—they may help you land the job. Free to the trade.

H. A. THRUSH & Co., Peru, Indiana

THRUSH SYSTEM

OF HOT WATER HEATING

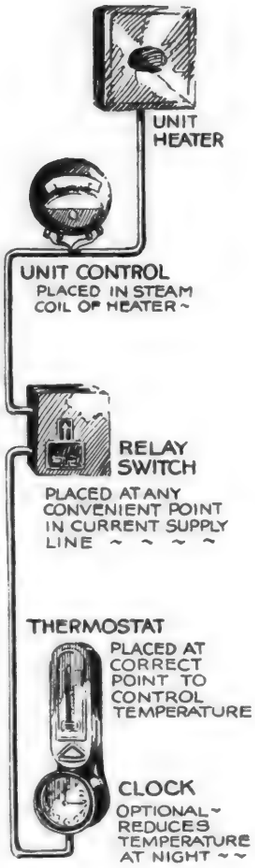
For Automatic Control of Unit Heaters



The Minneapolis 7-jewel clock-type room thermostat.

The World's Standard Automatic Controls

Uniform Heating, Economy at Night, Higher All-Around Efficiency—with Automatic Regulation.



If unit heating installations are successful or unsuccessful, the heater receives the praise or blame. But much of the efficiency of this type of heating system actually depends on control. Now the Minneapolis organization offers a new application of standard Minneapolis equipment—solving this important problem through completely automatic regulation.

The Minneapolis room thermostat, employing low voltage exposed wiring, can be installed economically at the proper point for best results. Maintains a uniform working temperature throughout the day—a lower temperature at night if desired, to save fuel. Change of temperature level is made automatically, night and morning.

The Minneapolis relay switch also may be placed at the most convenient point. For large motors drawing over 10 amperes, it acts as pilot relay for automatic starting switch.

Dual Control

Minneapolis dual control, through a limiting thermostat placed in the steam coils, prevents operation of blower when radiation is cold. Eliminates blowing cold air into the room through outside intakes. Prevents freezing of pipes.

Write for complete information on this latest development in industrial unit heating.

MINNEAPOLIS HEAT REGULATOR CO.
Established 1885
2804 Fourth Ave., So. · Minneapolis, Minn.

Low voltage wiring requires no conduits. Thermostat and relay switch can be placed where controls belong. Operation is completely automatic.

The "MINNEAPOLIS" HEAT REGULATOR FOR UNIT HEATING

Montgomery Ward Memorial Bldg.,
Medical and Dental Schools,
Northwestern University,
McKinlock Campus,
Chicago, Illinois.

James Gamble Rogers, Architect, New York City.
Childs & Smith, Associate Architects, Chicago, Ill.
W. L. Fergus, Heating Engineer, Chicago, Ill.
Wm. A. Pope, Heating Contractor, Chicago, Ill.

Arco Packless Valves for steam, water or vapor, are made in angle, corner and globe patterns. Name on dial, if desired.

The 1500 valves in this famous building will need no attention

IN THIS newest addition at Northwestern University where Arco Packless Valves are installed on all of the 1500 radiators, there will be no trouble calls to stop leaks. And there will be no annual repacking to increase maintenance expense.

Arco Packless Valves were selected because they bring to every building these four advantages:

1. Arco Packless Valves are good looking. They add a finishing touch of smartness to a radiator.
2. They prevent leaks—one of which may cost more than all the valves in the building.
3. They pay for themselves by saving the annual expense of repacking.
4. They add to the comfort of the owner or his tenants. Arco Packless Valves open with one smooth turn.

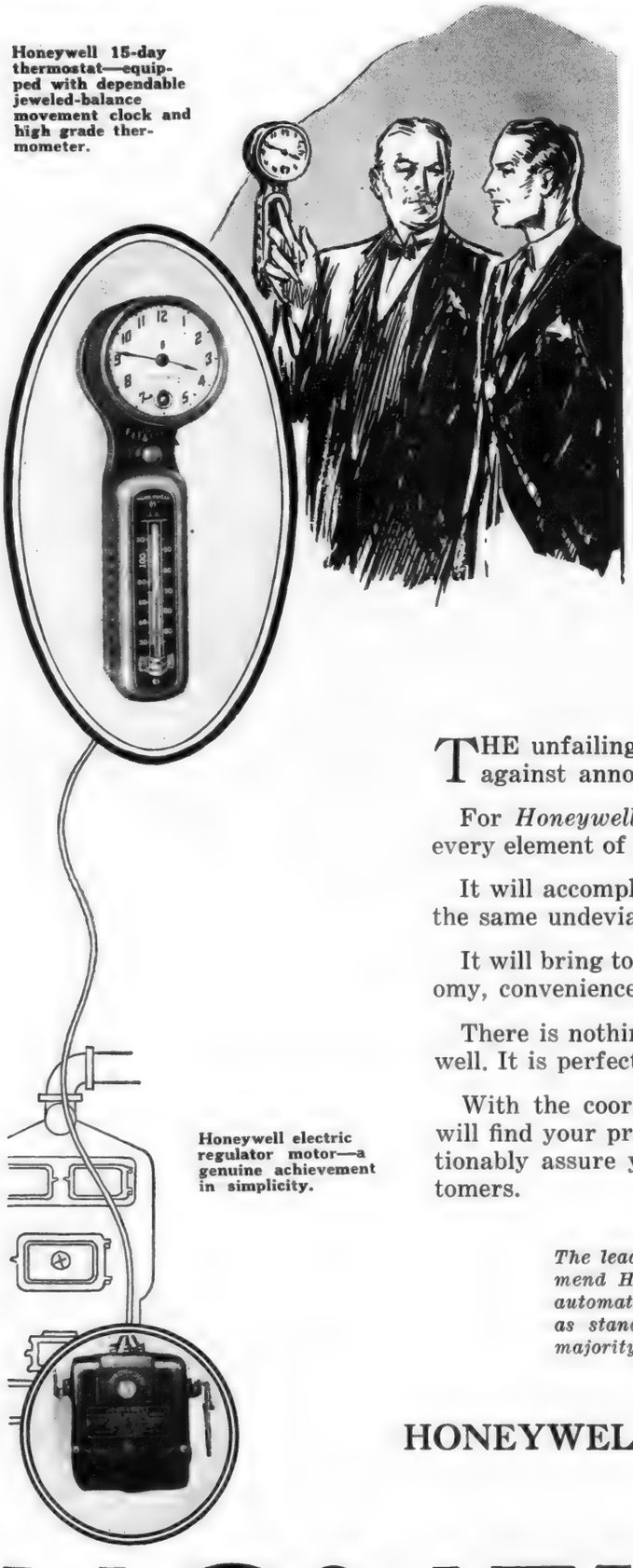
A heating plant deserves accessories that insure perfect performance. Every radiator deserves an Arco Packless Valve.

The Arco Packless Valve is one of many heating accessories made and guaranteed by

AMERICAN RADIATOR COMPANY

816 So. Michigan Ave. *Specialties Department* Chicago, Ill.

ARCO Packless Valves



Honeywell 15-day thermostat—equipped with dependable jeweled-balance movement clock and high grade thermometer.

Honeywell electric regulator motor—a genuine achievement in simplicity.

Eliminate Annoying Service Demands

THE unfailing dependability of *Honeywell* is your assurance against annoying and costly servicing.

For *Honeywell* has very definitely and conclusively removed every element of uncertainty from automatic control.

It will accomplish the things claimed for it consistently, with the same undeviating precision, for an indefinite period.

It will bring to your product a new measure of efficiency, economy, convenience, comfort and safety.

There is nothing experimental or problematical about Honeywell. It is perfected, time-tried and proven.

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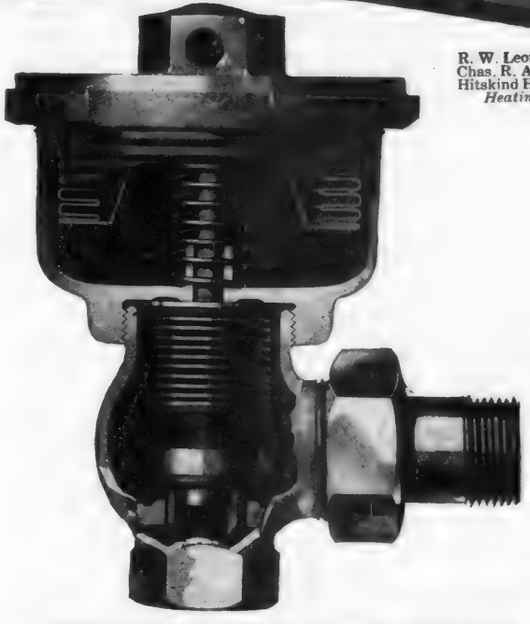
WABASH, INDIANA

HONEYWELL
Temperature Regulators

B & B All Metal Duplex Thermostat makes it possible without elaborate arrangement of piping and hand control valves to operate an entire building with control when desired and provides a method whereby any room or group of rooms may be provided with heat, while portions of the building in which heat is not desired are cut off from source of steam.

Positive or Graduate Type All Metal Thermostat

R. W. Leonard, *Architect*
Chas. R. Ammerman, *Engineer*
Hitskind Heating & Plumbing Co., *Heating Contractors*



Bishop & Babcock Multiflex Pneumatic Radiator Valve for Temperature Control Installations is quick and accurate in opening and closing; affords positive regulation for steam entering radiator, operates automatically, an integral part of the B & B Temperature Control System.

CASS County Hospital, Logansport, Ind., where positive control of the units of radiation is always required—Bishop & Babcock Temperature Control System has been installed.

The B & B All Metal Thermostat illustrated is the last word in simplicity, consisting of one moving part—the double-seated air valve operated directly by the thermal member.

This air valve is a large port valve with operating stem, which moves up and down through the port, thus it cannot clog with dust.

The thermal member is mounted on a frame, so that its operation is not affected by the expansion or contraction of the frame itself due to wall temperature.

The B & B All Metal Thermostat will control the temperatures of various rooms within less than one degree.

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BISHOP & BABCOCK
TEMPERATURE REGULATION

"A Concern is known by the Companies it keeps"

ILLINOIS ENGINEERING CO.
Inter-Office Correspondence

Chicago, Nov. 1, 1926.

Gentlemen:

Among October sales, we note orders from or for the following Corporations:

American Can Co.,
American Express Co.,
American Shipbuilding Co.,
American Fork and Hoe Co.,
Armour & Company,
Swift & Company,
Standard Oil Co. of California,
Standard Oil Co. of Ohio,
Pure Oil Company,
Sinclair Oil Company,
Dupont Company,
E. I. Dupont deNemours Co.,
Corn Products Refining Co.,
National Biscuit Company,
A. G. Spaulding & Bros.,
National Lead Company,
National Fireproofing Co.,
Wurlitzer Company,
Battle Creek Sanitarium,
Libbey Glass Company,
Barber Asphalt Company,
New Jersey Zinc Company,
Simonds Saw Company,
Dodge Mfg. Company,
Central Mfg. District,
City of Cleveland,
Cook County, Illinois,
City and County San Francisco,
Crane Company,
Walworth Company,
Pacific Telephone and Telegraph Co.,
General Fire Extinguisher Company,
Rockwood Sprinkler Company,
B. F. Sturtevant Company,
Minnesota Steel Company,
C. R. I & P. Ry.,
I. C. R. R.,
C. M. & St. P. R. R.,
C. St. P. M. & O. Ry.,
New York Central R. R.,
Bessemer and Lake Erie R. R.,
A. T. & S. F. Ry.,
Reading R. R.,
Pullman Company,
Nash Motors,
Packard Motor Car Company,
Willard Storage Battery,
Electric Storage Battery,
Atwater Kent Company,
Delco Light Company,
Fisher Body Company,
Great Western Power Co.,
So. Indiana Gas and Electric Co.,
No. Indiana Power Company,
Commonwealth Edison Company,
Interstate Power Co.,
Va. Western Power Co.,
New York Steam Co.,
Ohio Edison Company,
Florida East Coast Hotels Co.

This list made up from a single month's business, reads like a section of the New York Stock Exchange list, and it is very gratifying to know that the merit of our products is so generally recognized by such Corporations.

The above is tangible evidence of our unusual success, our products not only stay sold, without service, but one sale nearly always leads to repeat orders.

Yours very truly,

ILLINOIS ENGINEERING COMPANY.

By Robt. L. Gifford, Pres.

RLG-S

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ROBT. L. GIFFORD President INCORPORATED 1900

CHICAGO

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1. No expansion tank either open or closed
2. Quickly installed on either new or old jobs
3. Water in system always fresh
4. Rapid circulation due to pressure and fresh water
5. Entirely automatic as to supply, relief and damper regulation
6. A very considerable saving in fuel, due to automatic control of dampers and rapid circulation
7. Perfectly safe, as both reducing valve and relief valve are operated by pressure of water in the system
8. The reducing valve and relief valve are positive in action and durable, the working parts being made of bronze with phosphor bronze diaphragms
9. The boiling point of water is raised to a higher point than with the open system

"Hot water heat—of course but expansion tank—never again!"

That is what owners are saying. Hot water heat is preferred by thousands of home owners, but the obsolete expansion tank system is doomed. Owners are demanding — contractors everywhere are recommending — Mueller Automatic Heat Control for hot water heating plants. It costs no more.

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MUELLER

Automatic Heat Control System

328

Read what this Supply Salesman says of
ARCO WATER REGULATOR

L. A. BLAND, who sells for the U. S. Supply Company, Kansas City, Missouri, feels that every heating contractor should put an Arco Water Regulator on every job he installs.

He says: "Whenever the owner of a hot water heating plant has trouble getting hot water, I recommend an Arco Water Regulator, for I know it will give him not only ample hot water at a certain temperature, but it will also save him a lot of fuel."

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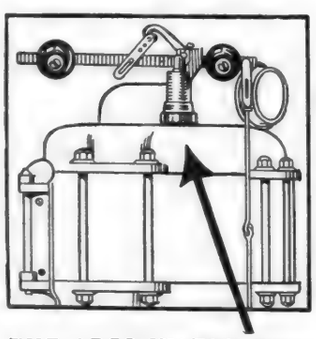
But Arco Water Regulators do more than this to every heating contractor — every one that you install means an extra profit for you.



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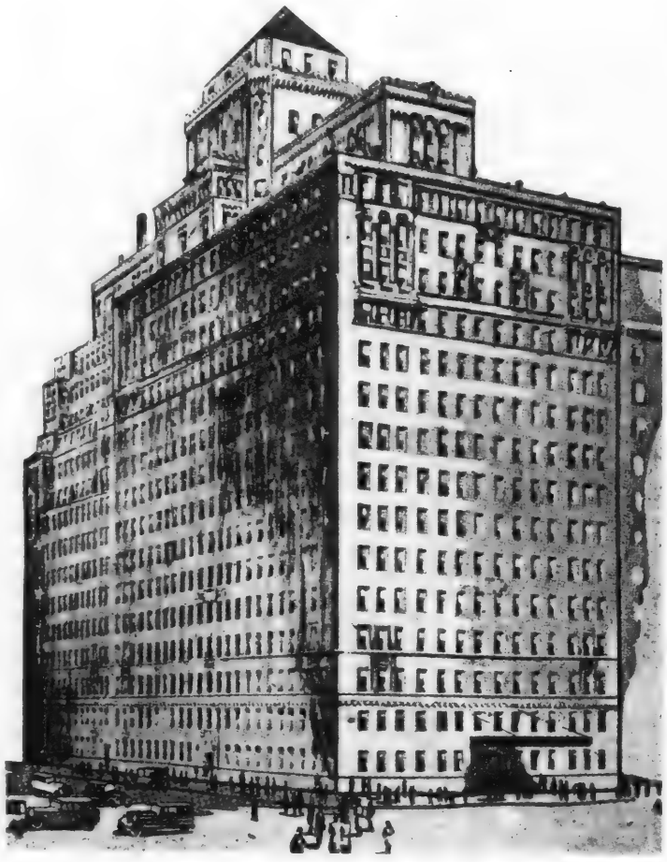
Literature covering any of our products cheerfully sent on request

MILWAUKEE VALVE COMPANY - MILWAUKEE, WISCONSIN



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Engineers

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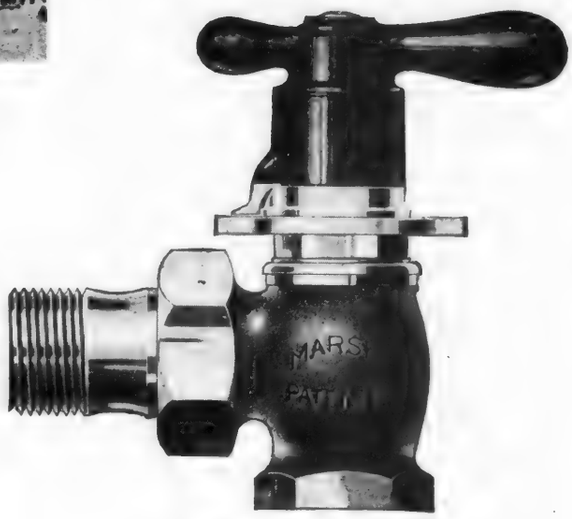
Heating Contractors

Marsh Cone Disc Modulated Valves used throughout on this Job



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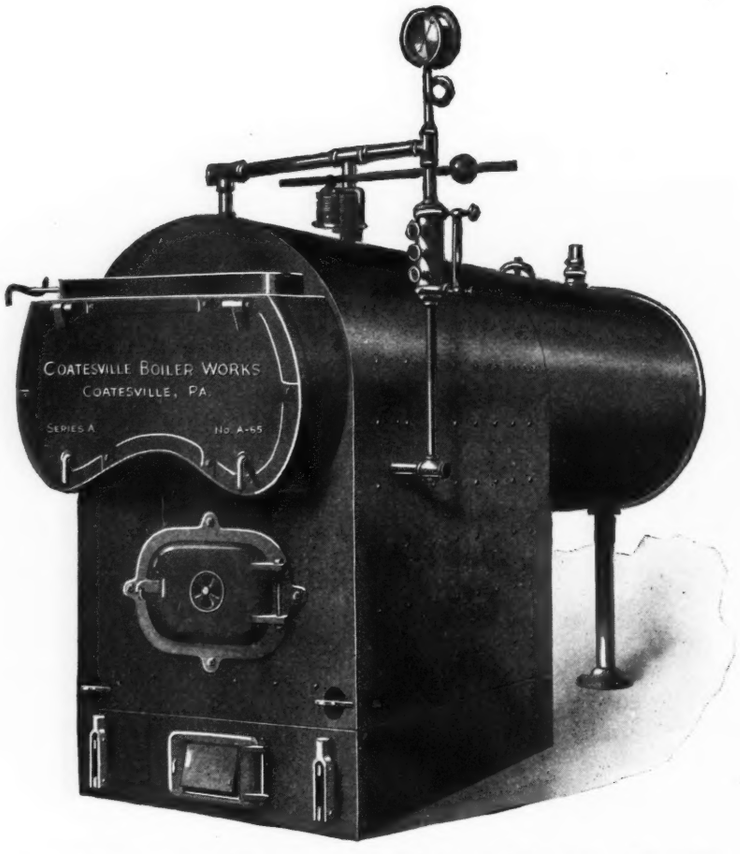

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The Heating and Ventilating Magazine

VOL. XXIII

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